The Quiz must be submitted on Canvas. You need to have a paper quiz to complete this quiz on Canvas. It is recommended to complete Quiz on paper and then enter your answers on Canvas. The correct answers will be available in your feedback on Canvas later today.

Canvas shuffles answers: the answers will be presented in a different order on Canvas, as compared to the paper ICA.

Quiz #1 points (maximum 100 points): 30 base points + up to 70 points for correct answers.

Problem #1 (19 points): A set of individual multiple choice questions

Problem #1 includes Questions 1 - 19

1. (1 pt) Utility represents
A (a). Consumer preferences
b). Income available for consumption activities

2. (1 pt) Budget constraint represents
a). Consumer preferences
B (b). Income available for consumption activities

3. (1 pt) The total utility function is a function of
A (a). quantities of goods consumed
b). prices and income
c). quantities of goods consumed, prices and income

4. (1 pt) The budget constraint includes
A (a). prices, quantities and income
b). prices and income
c). quantities and prices
d). prices and quantities

5. (1 pt) The economic objective of final consumers is
a). to minimize expenditures
b). to maximize profit
c). to maximize income
D (d). to maximize total utility

6. (1 pt) Marginal utility is
A (a). the derivative of the total utility function with respect to product quantity
b). the derivative of the budget constraint with respect to product quantity
c). the derivative of the budget constraint with respect to product price
d). the derivative of the total utility function with respect to product price

7. (1 pt) A graphical representation of the total utility function is
a). budget line
B (b). indifference curve

8. (1 pt) A graphical representation of the budget constraint is
A (a). budget line
b). indifference curve

9. (1 pt) All consumption bundles (baskets) providing the same level of total utility are located on the same indifference curve
A (a). True
b). False

10. (1 pt) Indifference curves for the same individual are parallel to each other (i.e. do not intersect)
A (a). True
b). False

11. (1 pt) A higher indifference curve is always better
A (a). True
b). False

12. (1 pt) If a consumer's income increases, he will move to a higher (level of) indifference curve, assuming prices do not change
A (a). True
b). False

13. (1 pt) If a consumer's income decreases, he will move to a lower (level of) indifference curve, assuming prices do not change
A (a). True
b). False

14. (1 pt) The slope of indifference curve is
A (a). The ratio of marginal utilities
b). The price ratio

15. (1 pt) The slope of budget line is
a). The ratio of marginal utilities
B (b). The price ratio

16. (1 pt) The tangency condition is
a). Indifference curve slope > Budget line slope
b). Indifference curve slope < Budget line slope
C (c). Indifference curve slope = Budget line slope

17. (1 pt) A consumption bundle located at the point where indifference curve is tangent to the budget line (on a graph) is

(a). optimal consumption bundle

A b). a consumption bundle, which is affordable, but not optimal

c). a consumption bundle, which is not affordable, but provides a higher utility level than optimal consumption bundle

18. (1 pt) A consumption bundle located to the left from the budget line (on a graph)

a). optimal consumption bundle

B (b). a consumption bundle, which is affordable, but not optimal

c). a consumption bundle, which is not affordable, but provides a higher utility level than optimal consumption bundle

19. (1 pt) A consumption bundle located to the right from the budget line (on a graph)

a). optimal consumption bundle

b). a consumption bundle, which is affordable, but not optimal

C (c). a consumption bundle, which is not affordable, but provides a higher utility level than optimal consumption bundle

Problem #2 (21 points) *Consumer Choice: Optimal Consumption Bundle*

Problem #2 includes Questions 20 - 25

A consumer purchases two goods: **F (food)** and **C (clothing).**
The consumer's total utility function is **TU = F×C+F+C.**
F and C are measured in physical units (quantity of food and quantity of clothing).
Product prices: **Pf = $1 per unit** and **Pc = $2 per unit.**
The available **budget** to spend on food and clothing is **$45.**

20. (3 pts) Select a **correct formulation of the total utility maximization problem** for this consumer.
a). The consumer maximizes the total utility.
b). The consumer minimizes his expenditures on food and clothing to maximize his total utility.
C (c). The consumer maximizes the total utility subject to a budget constraint.

Determine (calculate) the optimal consumption bundle for this consumer.
Proceed by answering questions 21 - 25.

21. (3 pts) **Marginal Utility** the consumer receives **from consuming food** is $MU_F = \frac{dTU}{dF} = C+1$
A (a). $MU_F = C+1$ b). $MU_F = C$ c). $MU_F = F \times C+1$

22. (3 pts) **Marginal Utility** the consumer receives from **consuming clothing** is $MU_C = \frac{dTU}{dC} = F+1$
A (a). $MU_C = F+1$ b). $MU_C = F$ c). $MU_C = F \times C+1$

23. (4 pts) The **tangency condition** is $\frac{MU_F}{MU_C} = \frac{P_F}{P_C}$
A (a). $\frac{C+1}{F+1} = \frac{1}{2}$ b). $\frac{C}{F} = \frac{1}{2}$ c). $\frac{C}{F} = \frac{2}{1}$

24. (4 pts) The **budget constraint** is $P_F \times F + P_C \times C = B \Rightarrow 1F + 2C = 45$
C a). $F \times C + F + C = 45$ b). $2 \times F + 1 \times C = 45$ (c). $1 \times F + 2 \times C = 45$

25. (4 pts) Use the tangency condition and budget constraint to **calculate the optimal consumption bundle** for this consumer.

Show your work here:

B a). F = 11 units and C = 23 units
(b). F = 23 units and C = 11 units
c). F = 45 units and C = 22.5 units
d). F = 45 units and C = 90 units

Problem #3 (30 points) *Consumer Demand Analysis:* Retail Demand for *Rice*

Problem #3 includes Questions 26 - 35

You have estimated the following demand function for *rice* at the retail level. Note that this is a *linear* multivariate function. *Potatoes* and *pasta* a products-substitutes for *rice*.

$$Q_{rice} = 10 - 15 \times P_{rice} + 12 \times P_{potatoes} + 10 \times P_{pasta} + 0.025 \times I$$

Q rice is the quantity of rice demanded (purchased) per person per year (pounds)
P rice is retail price of rice ($ per pound)
P potatoes is retail price of potatoes ($ per pound)
P pasta is retail price of pasta ($ per pound)
I is income available to spend on food ($ per year)

26. (3 pts) Interpret the ***coefficient** for **price of rice**.* -15

a). If rice price decreases by 1%, then rice quantity increases by 15% per person per year
B (b). If rice price increases by $1 per pound, then rice quantity decreases by 15 pounds
(c). If rice price decreases by $1 per pound, then rice quantity decreases by 15 pounds

27. (3 pts) Interpret the ***coefficient** for **price of potatoes**.* 12

A (a). If potato price increases by $1 per pound, then rice quantity increases by 12 pounds
b). If potato price decreases by $1 per pound, then rice quantity increases by 12 pounds
c). If potato price increases by 1%, then rice quantity increases by 12% per person per year

28. (3 pts) Interpret the ***coefficient** for **price of pasta**.* 10

B (b). If pasta price decreases by $1 per pound, then rice quantity decreases by 10 pounds
a). If pasta price increases by $1 per pound, then rice quantity decreases by 10 pounds
c). If pasta price decreases by 1%, then rice quantity decreases by 10% per person per year

29. (3 pts) Interpret the ***coefficient** for **income.*** 0.025

B (b). If income increases by $1, then rice quantity increases by 0.025 pounds per person per year
a). If income increases by 1%, then rice quantity increases by 0.025% per person per year
c). If income increases by $1, then rice quantity decreases by 0.025 pounds per person per year

Use the coefficients from the demand function to predict changes in the demand for rice: questions 30-33.

30. (3 pts) If ***price of rice increases by $2 per pound***, predict **the change in quantity of rice** demanded

$\Delta Q_R = -15 \times 2 = -30$

B (b). Quantity of rice decreases by 30 pounds
a). Quantity of rice decreases by 15 pounds
c). Quantity of rice increases by 30 pounds
d). Quantity of rice decreases by 30%

31. (3 pts) If *price of potatoes decreases by $2 per pound*, predict **the change in quantity of rice** demanded

$\Delta Q_R = 12 \times (-2) = -24$

a). Quantity of rice decreases by 12 pounds
B (b). Quantity of rice decreases by 24 pounds
c). Quantity of rice increases by 24 pounds
d). Quantity of rice decreases by 24%

32. (3 pts) If *price of pasta increases by $3 per pound*, predict **the change in quantity of rice** demanded

$\Delta Q_R = 10 \times 3 = 30$

✓ a). Quantity of rice increases by 10 pounds
✓ b). Quantity of rice increases by 10%
c). Quantity of rice decreases by 30 pounds
D (d). Quantity of rice increases by 30 pounds

33. (3 pts) *If income decreases by $1,000*, predict **the change in quantity of rice** demanded

$\Delta Q_R = 0.025(-1000) = -25$

A (a). Quantity decreases by 25 pounds
b). Quantity decreases by 2.5%
✓ c). Quantity increases by 25 pounds
d). Quantity decreases by 0.025 pounds

Use the demand function for rice to *predict quantity of rice demanded* in two market scenarios differing due to the demand determinants: questions 34 and 35.

$Q_{Rice} = 10 - 15(3.00) + 12(2.00) + 10(1.00) + 0.025(5000) =$

34. (3 pts) In the analyzed market: **P rice is $3.00 per pound, P potatoes is $2.00 per pound, P pasta is $1.00 per pound and the average income spent on food is $5,000 per year.**
Predict rice quantity. $10 - 45 + 24 + 10 + 125 = 124$

a). Quantity of rice demanded (purchased) is 135 pounds per year
b). Quantity of rice demanded (purchased) is 125 pounds per year
C (c). Quantity of rice demanded (purchased) is 124 pounds per year

35. (3 pts) In the analyzed market: **P rice is $1.00 per pound, P potatoes is $2.00 per pound, P pasta is $3.00 per pound and the average income spent on food is $5,000 per year.**
Predict rice quantity. $Q_{Rice} = 10 - 15(1.00) + 12(2.00) + 10(3.00) + 0.025(5,000)$
$= 10 - 15 + 24 + 30 + 125 = 174$

a). Quantity of rice demanded (purchased) is 135 pounds per year
b). Quantity of rice demanded (purchased) is 125 pounds per year
C (c). Quantity of rice demanded (purchased) is 174 pounds per year

********** BASE POINTS QUESTION**********

36. (30 pts) To get your base points, confirm the following statement: "I am a student taking AGRB 4560 in Spring 2020".

A (a). True b). False

AGRB 4560 **QUIZ #1 (100 pts)** Name AK 01-29-2019

Question #1 (50 points) *Consumer Choice: Optimal Consumption Bundle*

OPT: $F^* = 23$ units, $C^* = 11$ units

A consumer purchases two goods: **F (food)** and **C (clothing).**
The consumer's total utility function is **TU(F,C) = F×C+F+C.**
F and C are measured in physical units (quantity of food and quantity of clothing)
Product prices: **Pf = $1 per unit** and **Pc = $2 per unit.**
The available **budget** to spend on food and clothing is **$45.**

1. (5 pts) Select a **correct formulation of the total utility maximization problem** for this consumer.
a). The consumer maximizes the total utility.
b). The consumer minimizes his expenditures on food and clothing to maximize his total utility.
C (c). The consumer maximizes the total utility subject to a budget constraint.

Determine (calculate) the optimal consumption bundle for this consumer.
Proceed by answering questions 2-6.

2. (5 pts) **Marginal Utility** the consumer receives **from consuming food** is
A (a). $MU_F = C+1$ b). $MU_F = C$ c). $MU_F = F \times C+1$ $MU_F = \frac{dTU}{dF} = C+1$

3. (5 pts) **Marginal Utility** the consumer receives from **consuming clothing** is
A (a). $MU_C = F+1$ b). $MU_C = F$ c). $MU_C = F \times C+1$ $MU_C = \frac{dTU}{dC} = F+1$

4. (5 pts) The **tangency condition** is
A (a). $\frac{C+1}{F+1} = \frac{1}{2}$ b). $\frac{C}{F} = \frac{1}{2}$ c). $\frac{C}{F} = \frac{2}{1}$ $\frac{MU_F}{MU_C} = \frac{P_F}{P_C}$

5. (5 pts) The **budget constraint** is
C a). $F \times C+F+C = 45$ b). $2 \times F+1 \times C = 45$ (c). $1 \times F+2 \times C = 45$ $P_F F + P_C C = B$

6. (25 pts) Use the tangency condition and budget constraint to **calculate the optimal consumption bundle** for this consumer. ***YOU MUST SHOW your analytical work (i.e. calculations) to receive the points for this particular question. No analytical work shown -> 0 points for question 6 .***

TC: $\frac{C+1}{F+1} = \frac{1}{2}$ (1) $\rightarrow$ $F+1 = 2C+2$

$F = 2C+1$ (3) $\rightarrow$ (2)

BC: $1F+2C = 45$ (2)

$1(2C+1)+2C = 45$

$2C+1+2C = 45$

$4C = 44$

My answer is: F = 23 units and C = 11 units

$C^* = 11$ units (4) $\rightarrow$ (3)

$F = 2C+1 = 2(11)+1 = 23$

$F^* = 23$ units

w.c. check: $1F+2C = 45$

$1(23)+2(11) = 45$

$23+22 = 45$

$45 = 45$ ✓

AGRB 4560 **QUIZ #2 (100 points)**

NAME_____

Canvas Score (points) _____

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Quiz #2 points (maximum 100 points): 22 base points + up to 78 points for correct answers.

Problem #1 (12 points) **Consumer Demand for *Rice***
Formulating Economic Model and Econometric Model

Problem 1 includes Questions 1-6 (each correct answer is 2 points)

A grain distributor (wholesaler) hired you as a consultant to perform a demand analysis for rice sold at the retail level in the U.S. Using the United States Department of Agriculture (USDA) database, you compiled a data set, which included variables that could be potentially used in a rice demand analysis at the retail level. The variables are summarized in a table below.

Variable		**Unit of measurement**
Price of rice	P rice	$ per pound
Quantity of rice purchased (demanded)	Q rice	pounds per person per year
Price of potatoes	P potatoes	$ per pound
Quantity of potatoes purchased (demanded)	Q potatoes	pounds per person per year
Price of beans	P beans	$ per pound
Quantity of beans	Q beans	pounds per person per year
Income	Income	$ per person per year

Assume potatoes and beans are products-substitutes for rice.

1. Formulate a **theoretical (economic) model** explaining consumer demand for rice at the retail level.

a). P rice = f (Q rice, P potatoes, P beans, Income)
b). P rice = f (Q rice, Q potatoes, Q beans, Income)
c). Q rice = f (P rice, Q potatoes, Q beans, Income)
d). Q rice = f (P rice, P potatoes, P beans, Income)

2. Formulate **an econometric model to be estimated** ("a" is alpha, "b's" are betas and "e" is error term)

a) P rice = a - b1 * Q rice + b2 *P potatoes + b3* P beans + b4 * Income + e
b) Q rice = a – b1 * P rice + b2 * P potatoes + b3 * P beans + b4 * Income + e
c) Q rice = a + b1 * P rice + b2 * P potatoes + b3 * P beans + b4 * Income +e
d) P rice = a + b1 * Q rice + b2 *P potatoes + b3* P beans + b4 * Income + e

Using consumer demand theory, formulate a set of testable hypotheses: Questions 3-6

3. The relationship between Q rice and P rice: the estimated coefficient characterizing the relationship between these two variables is expected to be
a). Negative: the own price effect on quantity demanded
b). Positive: the cross-price effect on quantity demanded (assuming the price is for product – substitute)
c). Positive: the own price effect on quantity demanded
d). Negative: the cross-price effect on quantity demanded (assuming the price is for product – substitute)

4. The relationship between Q rice and P potatoes: the estimated coefficient characterizing the relationship between these two variables is expected to be
a). Negative: the own price effect on quantity demanded
b). Positive: the cross-price effect on quantity demanded (assuming the price is for product – substitute)
c). Positive: the own price effect on quantity demanded
d). Negative: the cross-price effect on quantity demanded (assuming the price is for product – substitute)

5. The relationship between Q rice and P beans: the estimated coefficient characterizing the relationship between these two variables is expected to be
a). Negative: the own price effect on quantity demanded
b). Positive: the cross-price effect on quantity demanded (assuming the price is for product – substitute)
c). Positive: the own price effect on quantity demanded
d). Negative: the cross-price effect on quantity demanded (assuming the price is for product – substitute)

6. The relationship between Q rice and Income: the estimated coefficient characterizing the relationship between these two variables is expected to be
a). Negative: the own price effect on quantity demanded
b). Positive: the cross-price effect on quantity demanded (assuming the price is for product – substitute)
c). Positive: the income effect on quantity demanded
d). Negative: the income effect on quantity demanded

Problem #2 (33 points) **An Analysis of Consumer Demand for *Rice***
Econometric (Regression) Model of* Retail Demand for *Rice:
Interpreting the Estimation Results

Problem #2 includes Questions 7-17 (each correct answer is 3 points)

Using a regression analysis technique and a relevant data set, you have estimated a demand function for *rice* at the retail level. This demand function characterizes the final consumer's purchasing (consumption) behavior. *Potatoes* are a product-substitute for *rice*. ***Your estimation results are summarized below.***

$$\ln Q_{rice} = 5 - 1.20 \times \ln P_{rice} + 0.70 \times \ln P_{potatoes} + 1.10 \times \ln I$$
$$\qquad\qquad (-2.65) \qquad\quad (0.95) \qquad\quad (1.75)$$

T-statistics are reported in the parentheses.
R2 = 0.80 or 80%.

Q rice is the quantity of rice demanded (purchased) per person per year (pounds)
P rice is retail price of rice ($ per pound)
P potatoes is retail price of potatoes ($ per pound)
I is income available to spend on food ($)

7. The estimated demand function is
a). a quantity-dependent demand function b). a price-dependent demand function

8. The estimated demand function is
a). a multivariate demand function b). a univariate demand function

9. The estimated demand function is
a). a linear demand function b). a log-linear demand function

10. A proper interpretation of the **flow of the causation effect** in this demand function is
a). a change in quantity of rice causes price of rice to change (i.e. quantity determines price)
b). a change in price of rice causes quantity of rice to change (i.e. price determines quantity)

11. Interpret R2
a). The variation in price of rice, price of potatoes and income explains 80% of the variation in the quantity of rice
b). The variation in the quantity of rice explains 80% of the variation in price of rice, price of potatoes and income
c). The variation in price of rice, price of potatoes and income explains 20% of the variation in the quantity of rice

Interpret the *sign* and *magnitude* of the *estimated coefficients (i.e. economic significance)*: Questions 12 – 14

12. *Interpret* the ***estimated coefficient*** *for* ***ln P rice***
a). If price of rice decreases by $1 per pound, then the quantity of rice purchased increases by 1.20 pounds
b). If the quantity of rice purchased increases by 1%, then price of rice decreases by 1.20%.
c). If price of rice decreases by 1%, then the quantity of rice purchased increases by 1.20%

13. *Interpret* the ***estimated coefficient*** *for* ***ln P potatoes***
a). If price of potatoes increases by $1 per pound, then the quantity of rice purchased increases by 0.70 pounds
b). If price of potatoes increases by 1%, then the quantity of potatoes purchased increases by 0.70%
c). If price of potatoes increases by 1%, then the quantity of rice purchased increases by 0.70%

14. *Interpret* the ***estimated coefficient*** *for* ***ln I***
a). If income decreases by $1, then the quantity of rice purchased decreases by 1.10 pounds
b). If income increases by $1, then the quantity of rice purchased increases by 1.10%
c). If income increases by 1%, then the quantity of rice purchased increases by 1.10%

Interpret *statistical significance* of the *estimated coefficients*: Questions 15 – 17.
Use the following significance (alpha) levels and corresponding T-statistic cut-off value
10% significance level: T-statistic cut-off value is |1.65|

15. Interpret *statistical significance* of the *estimated coefficient* for *ln P rice*
a). The estimated coefficient is not statistically significant from zero because -1.20 is smaller than the T-statistic cut-off value
b). The estimated coefficient is not statistically significant from zero because -2.65 is smaller than the T-statistic cut-off value
c). The estimated coefficient is statistically significant from zero because |-2.65| is greater than the T-statistic cut-off value

16. Interpret *statistical significance* of the *estimated coefficient* for *ln P potatoes*
a). The estimated coefficient is not statistically significant from zero because 0.70 is smaller than the T-statistic cut-off value
b). The estimated coefficient is not statistically significant from zero because 0.95 is smaller than the T-statistic cut-off value
c). The estimated coefficient is statistically significant from zero because 0.95 is greater than the T-statistic cut-off value

17. Interpret *statistical significance* of the *estimated coefficient* for *ln I*
a). The estimated coefficient is not statistically significant from zero because 1.10 is smaller than the T-statistic cut-off value
b). The estimated coefficient is not statistically significant from zero because 1.75 is smaller than the T-statistic cut-off value
c). The estimated coefficient is statistically significant from zero because 1.75 is greater than the T-statistic cut-off value

Problem #3 (33 points) An Analysis of Consumer Demand for *Potatoes* *Econometric (Regression) Model of* Retail Demand for *Potatoes: Interpreting the Estimation Results*

Problem #3 includes Questions 18 – 28 (each correct answer is 3 points)

Using a regression analysis technique and a relevant data set, you have estimated a demand function for *potatoes* at the retail level. This demand function characterizes the final consumer's purchasing (consumption) behavior. *Rice* is a product-substitute for *potatoes*. ***Your estimation results are summarized below.***

Q potatoes = 80 – 10*P potatoes + 8*P rice + 0.01*I
(-3.32) (2.00) (0.95)
T-statistics are reported in the parentheses.
R2 = 0.60 or 60%.

Q potatoes is the quantity of potatoes demanded (purchased) per person per year (pounds)
P potatoes is retail price of potatoes ($ per pound)
P rice is retail price of rice ($ per pound)
I is income available to spend on food ($)

18. The estimated demand function is
a). a quantity-dependent demand function b). a price-dependent demand function

19. The estimated demand function is
a). a multivariate demand function b). a univariate demand function

20. The estimated demand function is
a). a linear demand function b). a log-linear demand function

21. A proper interpretation of the **flow of the causation effect** in this demand function is
a). a change in quantity of potatoes causes price of potatoes to change (i.e. quantity determines price)
b). a change in price of potatoes causes quantity of potatoes to change (i.e. price determines quantity)

22. Interpret R2
a). The variation in price of potatoes, price of rice and income explains 40% of the variation in the quantity of potatoes
b). The variation in the quantity of potatoes explains 60% of the variation in price of potatoes, price of rice and income
c). The variation in price of potatoes, price of rice and income explains 60% of the variation in the quantity of potatoes

Interpret the *sign* and *magnitude* of the *estimated coefficients (i.e. economic significance)*: Questions 23 - 25 (next page)

23. *Interpret* the ***estimated coefficient*** *for* ***P potatoes***
a). If price of potatoes decreases by 1%, then quantity of potatoes increases by 10%
b). If quantity of potatoes increases by 1%, then price of potatoes decreases by 10%.
c). If quantity of potatoes increases by 10 pounds, then price of potatoes decreases by $1/pound
d). If price of potatoes increases by $1/pound, then quantity of potatoes decreases by 10 pounds

24. *Interpret* the ***estimated coefficient*** *for* ***P rice***
a). If price of rice increases by 1%, then quantity of potatoes increases by 8%
b). If price of rice decreases by $1.00 per pound, then quantity of potatoes increases by 8 pounds
c). If price of rice decreases by 1%, then quantity of potatoes decreases by 8 pounds
d). If price of rice decreases by $1.00 per pound, then quantity of potatoes decreases by 8 pounds

25. *Interpret* the ***estimated coefficient*** *for* ***I***
a). If income decreases by $1, then quantity of potatoes decreases by 0.01 pounds
b). If income increases by $1, then quantity of potatoes decreases by 0.01 pounds
c). If income increases by 1%, then quantity of potatoes increases by 1%

Interpret *statistical significance* of the *estimated coefficients*: Questions 26 - 28.
Use the following significance (alpha) levels and corresponding T-statistic cut-off value
10% significance level: T-statistic cut-off value is |1.65|

26. Interpret *statistical significance* of the *estimated coefficient* for *P potatoes*
a). The estimated coefficient is not statistically significant from zero because -10 is smaller than the T-statistic cut-off value
b). The estimated coefficient is not statistically significant from zero because -3.32 is smaller than the T-statistic cut-off value
c). The estimated coefficient is statistically significant from zero because |-3.32| is greater than the T-statistic cut-off value

27. Interpret *statistical significance* of the *estimated coefficient* for *P rice*
a). The estimated coefficient is not statistically significant from zero because 2.00 is smaller than the T-statistic cut-off value
b). The estimated coefficient is statistically significant from zero because 8 is greater than the T-statistic cut-off value
c). The estimated coefficient is statistically significant from zero because 2.00 is greater than the T-statistic cut-off value

28. Interpret *statistical significance* of the *estimated coefficient* for *I*
a). The estimated coefficient is not statistically significant from zero because 0.01 is smaller than the T-statistic cut-off value
b). The estimated coefficient is not statistically significant from zero because 0.95 is smaller than the T-statistic cut-off value
c). The estimated coefficient is statistically significant from zero because 0.95 is greater than the T-statistic cut-off value

29. To earn your *base* points (22 points), confirm the following statement "I am a student enrolled in AGRB 4560": a). True b). False

AGRB 4560

QUIZ #3 (100 points)

NAME HK

Canvas Score (points) _____

The Quiz must be submitted on Canvas. You need to have a paper quiz to complete this quiz on Canvas. It is recommended to complete Quiz on paper and then enter your answers on Canvas. The correct answers will be available in your feedback on Canvas later today.

Canvas shuffles answers: the answers will be presented in a different order on Canvas, as compared to the paper Quiz.

Quiz #3 points (maximum 100 points): 25 base points + up to 75 points for correct answers. Each correct answer is 3 points.

Price Analysis in the U.S. Onion Industry:
Estimating (quantifying) the **onion price-quantity relationship** using regression analysis technique and interpreting the estimation results

Problem #1: Questions 1- 13

Quantity affects Price or Price is a function of Quantity

Your ***objective*** is to ***conduct a price analysis in the U.S onion industry. At the first stage,*** you analyze the ***effect of changes in the onion quantity produced on the level of onion price received by onion growers.*** You have collected yearly data on onion quantity produced and onion price from the USDA National Agricultural Statistics Service database (see a table below).

Year	Onion Production: Quantity (million cwt)	Onion Price ($/cwt)
2000	73	11
2001	70	11
2002	70	12
2003	73	14
2004	84	9
2005	73	14
2006	73	16
2007	80	11
2008	75	12
2009	76	15
2010	74	16
2011	74	11
2012	71	14
2013	70	15
2014	70	14
2015	67	16
Average	***73***	***13***

AK

AGRB 4560 **QUIZ #3 (100 points)**

Units of measurement: Onion **quantity** produced is measured in **million cwt.**
Onion **price** is measured in **$ per cwt.**
cwt is one hundredweight (=100 pounds).

1. Select ***an economic model*** that reflects the analyzed price-quantity relationship. You will use this economic model to develop an econometric (regression) model to be estimated.

a). Q onions = f(P onions): the *quantity*-dependent demand function (i.e. *ordinary* demand)
B (b). P onions = f(Q onions): the *price*-dependent demand function (i.e. *inverse* demand)

2. Select ***an econometric (regression) model to be estimated*** in combination with the appropriate ***hypothesis for the coefficient*** for the right-hand-side variable (i.e. the expected sign: positive or negative). This should be ***a linear regression model.***

a). Q onions = a + b*P onions + e. Hypothesis: b < 0
b). P onions = a + b*Q onions + e. Hypothesis: b > 0
C (c). P onions = a + b*Q onions + e. Hypothesis: b < 0 demand: P ⊖ Q
d). ln P onions = a + b* ln Q onions + e. Hypothesis: b<0

You have estimated a ***linear regression model*** *using the OLS estimation procedure.* **The Excel regression output (i.e. estimation results) is attached (Attachment 1).** *Use this regression output to answer the rest of the questions included in Problem #1.*

3. Select ***the estimated econometric (regression) model.***

B (a). Q onions = 33.84 – 0.28*P onions $\alpha = 33.84$; $\beta = -0.28$
b). P onions = 33.84 – 0.28*Q onions
c). 33.84 = P onions – 0.28*Q onions

Interpretation of the estimation results: Questions 4-7 $R2 = 0.29$ OR 29%

4. ***Interpret R2*** (R square: the explanatory power of the estimated econometric model)
a). The variation in onion price explains 29% of the variation in onion quantity
b). The variation in onion price explains 71% of the variation in onion quantity
C (c). The variation in onion quantity explains 29% of the variation in onion price
d). The variation in onion quantity explains 71% of the variation in onion price

5. ***Interpret the estimated coefficient for the right-hand-side variable*** Q : $\beta = -0.28$
A (a). If onion quantity produced by onion growers increases by 1 million cwt, then onion price received by onion growers decreases by $0.28 per cwt
b). If onion price received by onion growers increases by $1 per cwt, then onion quantity produced by onion growers decreases by 0.28 million cwt
c). If onion quantity produced by onion growers increases by 1%, then onion price received by onion growers decreases by 0.28%
d). If onion quantity produced by onion growers increases by 1 cwt, then onion price received by onion growers decreases by $0.28 per cwt

6. Interpret ***statistical significance of the constant (intercept):***
use Alpha level = 10% and T-statistic cut-off value = |1.65|

A a). Constant is statistically significant from zero, because 3.85 is greater than the T-statistic cut-off value
b). Constant is statistically significant from zero, because 33.84 is greater than the T-statistic cut-off value
c). Constant is not statistically significant from zero, because 3.85 is smaller than the T-statistic cut-off value

7. Interpret ***statistical significance of the estimated coefficient for the right-hand-side variable:***
use Alpha level = 10% and T-statistic cut-off value = |1.65|

a). The estimated coefficient is not statistically significant from zero, because -0.28 is smaller than the T-statistic cut-off value
b). The estimated coefficient is statistically significant from zero, because |-0.28| is greater than the T-statistic cut-off value
C c). The estimated coefficient is statistically significant from zero, because |-2.36| is greater than the T-statistic cut-off value
d). The estimated coefficient is not statistically significant from zero, because -2.36 is smaller than the T-statistic cut-off value

Conducting onion price forecast: Questions 8-12

8. Use the estimation results (the estimated coefficient) to ***conduct an onion price forecast***. In particular, ***predict a change in onion price*** received by onion growers, ***if onion quantity produced by onion growers during a particular year increases by 2 million cwt***

a). onion price increases by $0.28 per cwt
b). onion price increases by $0.56 per cwt
c). onion price decreases by $0.28 per cwt
D d). onion price decreases by $0.56 per cwt

9. Use the estimation results (the estimated coefficient) to ***conduct an onion price forecast***. In particular, ***predict a change in onion price*** received by onion growers, ***if onion quantity produced by onion growers during a particular year decreases by 2 million cwt***

a). onion price increases by $0.28 per cwt
B b). onion price increases by $0.56 per cwt
c). onion price decreases by $0.28 per cwt
d). onion price decreases by $0.56 per cwt

10. Use the estimation results (the estimated econometric model: equation from Question 3) to ***conduct an onion price forecast***. In particular, ***predict onion price, of onion growers produce 70 million cwt of onions*** during a particular year

A

a). $14.24 per cwt
b). $53.44 per cwt
c). $33.84 per cwt

$P = 33.84 - 0.28Q$
$= 33.84 - 0.28(70)$
$= 33.84 - 19.6 = \$14.24/cwt$

11. Use the estimation results (the estimated econometric model: equation from Question 3) and the yearly average onion quantity produced equal to 73 million cwt to ***calculate onion price flexibility***. Onion price flexibility is

B

a). 1.53 b). -1.53 c). 153% d). -0.05 e). -1.57

$-1.53 = \varepsilon_{P,Q} = \frac{\Delta P}{\Delta Q} \times \frac{\bar{Q}}{\bar{P}} = -0.28 \times \frac{73}{13.40}$

$\beta = -0.28$; $\bar{Q} = 73$ mill. cwt

$\bar{P} = 33.84 - 0.28(73)$
$= 33.84 - 20.44$
$= 13.40\$/cwt$

% ↑(↓) in P following a 1% ↓(↑) in Q

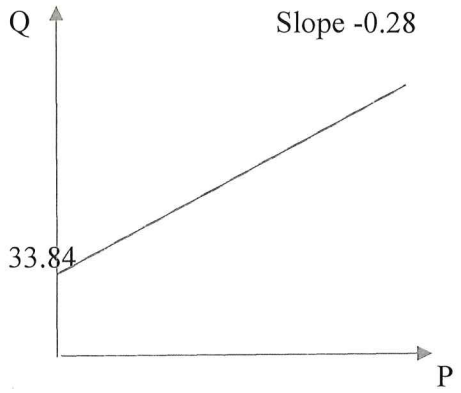
12. The calculated ***onion price flexibility indicates***

C

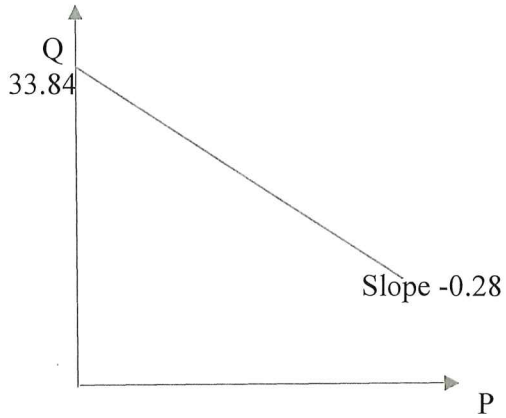
a). a % increase in onion quantity, which follows a 1% decrease in onion price
b). a % decrease in onion quantity, which follows a 1% increase in onion price
c). a % increase in onion price, which follows a 1% decrease in onion quantity
d). a % increase in onion price, which follows a 1% increase in onion quantity

13. Select a graph, which shows ***onion demand curve*** *reflecting your estimated demand function.*

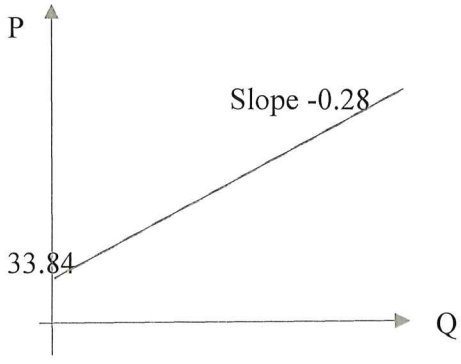
a). Graph A



b). Graph B

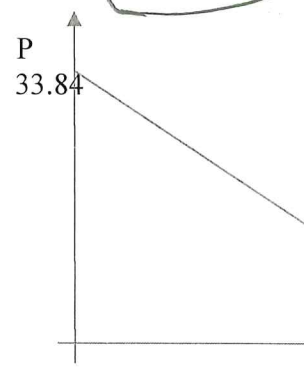


c). Graph C



d). Graph D

(y)



(x)

Inverse demand
price - dependent
demand
function

Problem #2: Questions 14-21

You ***continue conducting a price analysis*** in the U.S. onion industry. Your objective is to analyze the ***effect of changes in the onion quantity produced on the level of onion price received by onion growers. At the second stage,*** you have estimated ***a log-linear econometric (regression) model***, using onion quantity and price variables reported in the table on page 1. *You transformed these variables in the natural log form to estimate this log-linear regression model.*

14. Select ***an economic model*** that reflects the analyzed price-quantity relationship. You will use this economic model to develop an econometric (regression) model to be estimated.

a). Q onions = f(P onions): the *quantity*-dependent demand function (i.e. *ordinary* demand)
b). P onions = f(Q onions): the *price*-dependent demand function (i.e. *inverse* demand)

15. Select ***an econometric (regression) model to be estimated*** in combination with the appropriate ***hypothesis for the coefficient*** (i.e. the expected sign: positive or negative).

a). ln Q onions = a + b* ln P onions + e. Hypothesis: b < 0
b). ln P onions = a + b* ln Q onions + e. Hypothesis: b > 0
c). ln P onions = a + b* ln Q onions + e. Hypothesis: b < 0
d). P onions = a + b* Q onions + e. Hypothesis: b < 0

16. You have estimated a log-linear regression model using the transformed in natural log form onion quantities and prices. **The estimation results (regression output) are attached (Attachment 2).** Select the estimated econometric model.

a). Q onions = 10 – 2*P onions
b). ln Q onions = 10 – 2* ln P onions
c). P onions = 10 – 2*Q onions
d). ln P onions = 10 – 2* ln Q onions

17. ***Interpret*** *the estimated* ***coefficient*** *for the* ***right-hand-side variable*** → ln Q:
a). If onion price received by onion growers increases by 1%, then onion quantity produced by onion growers decreases by 2%
b). If onion quantity produced by onion growers increases by 1%, then onion price received by onion growers decreases by 2%
c). If onion quantity produced by onion growers increases by 1 million cwt, then onion price received by onion growers decreases by $2.00 per cwt
d). If onion quantity produced by onion growers decreases by 1%, then onion price received by onion growers decreases by 2%

18. Using the estimation results (regression output), determine the estimated ***onion price flexibility***

a). 10
b). -10
C ©). -2
d). 2
e). -20%

$\beta = -2$

19. ***Conclude whether the estimated onion price flexibility is statistically significant from zero:*** *use Alpha level = 10% and T-statistic cut-off value = |1.65|*

$\beta = -2$
$t\text{-st.} = -2.51$

a). Onion price flexibility is statistically significant from zero, because 10 is greater than the T-statistic cut-off value
b). Onion price flexibility is statistically significant from zero, because 3.37 is greater than the T-statistic cut-off value
c). Onion price flexibility is not statistically significant from zero, because -2.51 is smaller than the T-statistic cut-off value
D (d). Onion price flexibility is statistically significant from zero, because |-2.51| is greater than the T-statistic cut-off value

20. Use your estimation results (the estimated coefficient for the right-hand-side variable) to ***conduct an onion price forecast***. In particular, ***predict a change in onion price*** received by onion growers, ***assuming that onion quantity produced by onion growers decreases by 2% in a particular year.***

$\ln Q$

$f_{P,Q} \equiv \beta = -2$
$Q \downarrow$ by 1% $\rightarrow P \uparrow$ by 2%
$Q \downarrow$ by 2% $\rightarrow P \uparrow$ by 4%
$= -2(-2) = +4$

a). onion price decreases by $4.00 per cwt
b). onion price decreases by 4%
c). onion price increases by $4.00 per cwt
D (d). onion price increases by 4%

21. Use your estimation results (the estimated coefficient for the right-hand-side variable) to ***conduct an onion price forecast***. In particular, ***predict a change in onion price*** received by onion growers, ***assuming that onion quantity produced by onion growers increases by 2% in a particular year.***

$f_{P,Q} \equiv \beta = -2$
$Q \uparrow$ by 1%, $P \downarrow$ by 2%
$Q \uparrow$ by 2%, $P \downarrow$ by 4%
$= 2(-2) = -4$

a). onion price decreases by $4.00 per cwt
B (b). onion price decreases by 4%
c). onion price increases by $4.00 per cwt
d). onion price increases by 4%

AK

AGRB 4560 **QUIZ #3 (100 points)**

Problem #3: Questions 22 - 25

You ***continue conducting a price analysis*** in the U.S. onion industry. ***At the third stage,*** you analyze the ***effects of changes in the onion area harvested and onion yield per acre on the level of onion price received by onion growers.*** area and yield affect price

Units of measurement: Onion **area harvested** is measured in **thousand acres.**
Onion **yield *per acre*** is measured in **cwt per acre.** Onion **price** is measured in **$ per cwt**.

*You have **estimated a linear regression model**. T-statistics are in the parentheses.*

PRICE onions = 20 – 0.10*AREA onions – 0.05*YIELD onions
$/cwt (- 3.55) thousand (-0.90) cwt/acre
acres

R2 = 0.70 or 70%

22. ***Interpret*** the estimated ***coefficient*** for ***AREA*** −0.10

a). If onion area harvested decreases by 1,000 acres, then onion price increases by 0.10%
B (b). If onion area harvested decreases by 1,000 acres, then onion price increases by $0.10 per cwt
c). If onion area harvested increases by 1%, then onion price decreases by 0.10%

23. ***Interpret*** the estimated ***coefficient*** for ***YIELD*** −0.05

a). If onion yield decreases by 1 cwt per acre, then onion price increases by 0.05%
B (b). If onion yield decreases by 1 cwt per acre, then onion price increases by $0.05 per cwt
c). If onion yield increases by 1%, then onion price decreases by 0.05%

24. Choose a ***correct pattern*** of ***statistical significance*** of the ***estimated coefficients:***
use Alpha level = 10% and T-statistic cut-off value = |1.65|

a). The coefficient for AREA and the coefficient for YIELD are not statistically significant from zero
B (b). The coefficient for AREA is statistically significant from zero; the coefficient for YIELD is not statistically significant from zero
c). The coefficient for AREA is not statistically significant from zero; the coefficient for YIELD is statistically significant from zero

25. ***Interpret R2 (R square: the explanatory power of the estimated econometric model)*** R2 = 70%

a). The variation in onion price explains 70% of the variation in onion area and yield
B (b). The variation in onion area and yield explains 70% of the variation in onion price
c). The variation in onion price explains 30% of the variation in onion area and yield
d). The variation in onion area and yield explains 30% of the variation in onion price

BASE POINTS QUESTION

26. To get your base points (25 points), confirm the following statement: "I am a student enrolled in AGRB 4560"

A (a). True b). False

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.53
R Square	0.29
Adjusted R Square	0.23
Standard Error	1.88
Observations	16

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	19.74926837	19.7492684	5.584271768	0.033124965
Residual	14	49.51223163	3.53658797		
Total	15	69.2615			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	33.84	8.78966102	3.85	0.001768152	14.98672187	52.69061777	14.98672187	52.6906178
Onion Production (million cwt)	-0.28	0.119802129	-2.36	0.033124965	-0.540055186	-0.026155164	-0.540055186	-0.02615516

↑ Quantity

Linear Regression model

$P_{onions} = 33.84 - 0.28 Q_{onions}$

P_{onions}: $/cwt

Q_{onions}: million cwt

$R2 = 0.29$ or 29%

Attachment 1
Problem 1: AK

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.56
R Square	**0.31**
Adjusted R Square	0.26
Standard Error	0.15
Observations	16

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.134849352	0.134849352	6.322711322	0.024762756
Residual	14	0.298588822	0.021327773		
Total	15	0.433438174			

	Coefficients	*Standard Error*	***t Stat***	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	**10**	3.00194882	**3.37**	0.004607078	3.668514376	16.54559411	3.668514376	16.54559411
ln Onion Quantity	**-2**	0.69926776	**-2.51**	0.024762756	-3.258089115	-0.258528749	-3.258089115	-0.258528749

$\ln P_{onions} = 10 - 2 \ln Q_{onions}$

$\Downarrow$ onion price flexibility is stat. sig. from 0

$Tst = |-2.51|$

Attachment 2
Problem 2: AK