AP® Microeconomics
Sample Student Responses and Scoring Commentary
Set 1

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Free Response Question 2

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Question 2

5 points (1 + 1 + 3)

(a) 1 point:

- One point is earned for calculating Dana's total benefit from purchasing 2 bottles of water and 1 unit of good X as $66 and for showing the work.

  $24 + $18 + $24 = $66 OR $42 + $24 = $66

(b) 1 point:

- One point is earned for calculating Dana's total consumer surplus from purchasing 3 units of good X as $39 and for showing the work.

  ($24 – $5) + ($18 – $5) + ($12 – $5) = $39 OR $54 – $15 = $39

(c) 3 points:

- One point is earned for explaining that Dana does not maximize her benefit because the marginal benefit per dollar spent on bottles of water is greater than the marginal benefit per dollar spent on good X.

  (18/$3 > 6/$6; OR 6 > 1; OR 6≠1; OR $MB_w/P_w > MB_x/P_x$)

- One point is earned for stating that the optimal quantities of good X and bottles of water are 3 units and 4 bottles respectively.

- One point is earned for correctly determining the optimal quantity of water, calculating the cross-price elasticity of demand for bottles of water with respect to the price of good X, showing the work, and for stating that the goods are complements. Answer must be consistent with (c)(ii).

  (% change in the quantity of bottles of water)/(% change in the price of good X)
  = (25%/–50%) = –0.5

(Using the midpoint formula is also acceptable: (1/4.5)/(–3/4.5) = –0.33)

2A

a. total benefit = 24 + 18 + 24 = $66

b. total consumer surplus = $(24 + 18 + 12) - (3 \times 5)$

$\qquad = (54) - (15)$

$\qquad = \$39$

c. i. $\dfrac{MB_W}{P_W} = \dfrac{18}{3} = 6$

$\dfrac{MB_X}{P_X} = \dfrac{6}{6} = 1$

Since the marginal utility per dollar for each good are not equal, Dana is not maximizing her benefit

ii. $\dfrac{6}{3} = \dfrac{12}{6}$

The optimal quantity of good X is 3 units and the optimal quantity of water is 4 bottles

iii. $\dfrac{3}{3} = \dfrac{3}{3}$

$\%\Delta Q_{D_W} = \dfrac{5-4}{4} = 25\%$

$\%\Delta P_X = \dfrac{3-6}{6} = -50\%$

cross-price elasticity $= \dfrac{\%\Delta Q_{D_W}}{\%\Delta P_X}$

$\qquad = \dfrac{25\%}{-50\%}$

$\qquad = -0.5$

The two goods are complements

2B

a) $24 + 18 + 24 = \boxed{\$66}$

b) $3 \cdot 5 = \$15$ $24 + 18 + 12 = \$54$

     $54 - 15 = \boxed{\$39}$

c) i) buying more water gives a better benefit because it costs less then good x

ii) 3 quantities of good x

     4 quantities of water bottles

iii) cross price elasticity of demand $= 0$

     Substitutes

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2C

a) Dana's total benefit from purchasing 2 bottles of water and 1 unit of good X is $42.

b) $5 × 12 = 60

c) i) Dana did not maximize her benefit by purchasing only 2 bottles of water and 4 units of good X, because she could have spent her money differently to spend the exact same amount but gain a much higher marginal benefit.

   ii) the optimal quantity of bottles of water is 4 and the optimal quantity of good x is 3.

   iii) if the price of good X drops to $3, bottles of water and good x become essentially substitutes, because their prices and marginal benefit are interchangeable.

Question 2

Note: Student samples are quoted verbatim and may contain spelling and grammatical errors.

Overview

This question assessed students' ability to identify and analyze the optimal consumption bundle from a table with the marginal benefit of both products provided to the student. The concepts in the question included marginal analysis, calculating consumer surplus, maximizing marginal benefit, and an analysis of two goods to compare the marginal benefit of the last dollar spent based on a budget constraint.

The question included two matching tables containing data on the marginal benefit of water and of good X. In part (a) students were asked to calculate the total benefit from purchasing two bottles of water and one unit of good X. Students were directed to show their work, were expected to set up the equation correctly (= $24 + $18 + $24 or = $42 + $24), and to calculate the total benefit of $66.

In part (b) students were expected to calculate the total consumer surplus if 3 units of good X were purchased. Students were directed to show their work, were expected to set up the equation correctly (=($24-$5)+($18-$5)+($12-$5) or =$54-$15), and to calculate the total consumer surplus as $39.

Part (c) had three parts based on the assumption that the price of water was $3, the price of good X was $6, and the budget constraint was $30.

In part (c)(i) students were expected to explain why the consumer did not maximize her benefit with the purchase of 2 bottles of water and 4 units of good X. Students were directed to use marginal analysis to explain the answer. In the answer students had to explain that the marginal benefit per dollar of water was greater than the marginal benefit per dollar of good X (18/$3 > 6/$6 or 6 > 1).

Part (c)(ii) required students to assert the optimal quantities of good X and water at the prices of $6 and $3 respectively. The correct answer was 3 bottles of water and 4 units of good X. Students were not expected to explain or show work for this point.

Part (c)(iii) required students to calculate Dana's cross-price elasticity after the price of good X decreased from $6 to $3 and to show their work. Additionally, students were required to state whether the goods were complements or substitutes. Based on the number of water bottles chosen in (c)(ii) and the price change from $6 to $3, students were expected to set up the equation correctly (=25%/-50%) and to calculate the cross-price elasticity as -0.5. Students could have calculated the cross-price elasticity as -.33 by using an alternative formula for calculating the cross-price elasticity—the mid-point formula. Students also had to assert that the two goods are complements.

Sample: 2A
Score: 5

The student answers all parts of the question correctly and earned all 5 points.

Sample: 2B
Score: 3

The response did not earn 1 point in (c)(i) because it does not include an explanation that compares the marginal benefit per dollar spent for each good. The response did not earn 1 point in part (c)(iii) because it does not calculate the cross-price elasticity and conclude that the two goods are complements.

Sample: 2C
Score: 1

The response earned 1 point in part (c)(ii) for stating the optimal quantities as 3 units of good X and 4 bottles of water.