

**C. 22 points. Use the following information for problems 18 through 25. Be sure to show all of your work.**  
(Each blank is 2 points each)

Utility Function:  $U = X^2 * Y^3$  where  $X$  is the amount of good  $X$  consumed and  $Y$  is the amount of good  $Y$  consumed.

$$MU_x = 2XY^3$$

$$MU_y = 3X^2Y^2$$

$$\text{Income (I)} = \$100$$

$$P_x = \$4$$

$$P_y = \$2$$

18. What is the Marginal Value of  $X$  in terms of  $Y$  {  $MV_{x/y}$  }? \_\_\_\_\_

19. Write the equation of the budget constraint: \_\_\_\_\_

20. If I purchase no units of  $X$ , how much  $Y$  can I afford? \_\_\_\_\_

21. What is the optimal bundle of good  $X$  and  $Y$ ?  $X = \underline{\hspace{1cm}}$   $Y = \underline{\hspace{1cm}}$

22. What Total Utility is received at the optimal bundle? \_\_\_\_\_

Suppose the price of good  $Y$  increases from \$2 to \$4.

23. Derive the new optimal bundle of  $X$  and  $Y$ .  $X = \underline{\hspace{1cm}}$   $Y = \underline{\hspace{1cm}}$

24. From the information obtained about the consumption of good  $Y$  both before and after the price change, derive the equation of a linear demand curve for *good Y* that passes through both points.

$$P_y = \underline{\hspace{1cm}} * Y + \underline{\hspace{1cm}}.$$

25. What is the price elasticity of demand in this region? \_\_\_\_\_

**C. 22 points. Use the following information for problems 18 through 25. Be sure to show all of your work.**  
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Utility Function:  $U = X^2 \cdot Y^3$  where X is the amount of good X consumed and Y is the amount of good Y consumed.

$$MU_x = 2XY^3$$

$$MU_y = 3X^2Y^2$$

$$\text{Income (I)} = \$100$$

$$P_x = \$4$$

$$P_y = \$2$$

18. What is the Marginal Value of X in terms of Y {  $MV_{x/y}$  }? 2

19. Write the equation of the budget constraint:  $Y = 50 - 2X$

20. If I purchase no units of X, how much Y can I afford? 50 units

21. What is the optimal bundle of good X and Y?  $X =$  10  $Y =$  30

22. What Total Utility is received at the optimal bundle?  $(10^2) \cdot (30^3) = 100 \cdot 27000 = 2,700,000$

Suppose the price of good Y increases from \$2 to \$4.

23. Derive the new optimal bundle of X and Y.  $X =$  10  $Y =$  15

24. From the information obtained about the consumption of good Y both before and after the price change, derive the equation of a linear demand curve for *good Y* that passes through both points.

$$P_y = \underline{-2/15} \cdot Y + \underline{6}$$

25. What is the elasticity of demand in this region? 0.5

**SHOW YOUR WORK HERE:**