Kink Fahd University of Petroleum and Minerals
Department of Mathematics
Math 105
Major Exam I
213
June 28, 2022
Net Time Allowed: 120 Minutes

MASTER VERSION

1. A company manufactures two types of prefabricated houses: ranch and colonial. Last year they sold three times as many ranch models as they did colonial models. If a total of 2640 houses were sold last year, how many of each model were sold?

   (a) 660 colonials, 1980 ranches (correct)
   (b) 600 colonials, 1980 ranches
   (c) 660 colonials, 198 ranches
   (d) 1980 colonials, 660 ranches
   (e) 198 colonials, 66 ranches

2. A rectangular plot, 4 meters by 8 meters, is to be used for a garden. The owner decides to put a pavement of uniform width inside the entire border so that 12 square meters of the plot is left for flowers. How wide should the pavement be?

   (a) 1 meter (correct)
   (b) 3 meter
   (c) 5 meter
   (d) 4 meter
   (e) 2 meter

3. A good oiled furniture finish contains two parts boiled linseed oil and one part turpentine. If you need a pint (16 fluid ounces) of this furniture finish, how many fluid ounces of turpentine are needed?

(a) $4\frac{3}{3}$ (correct)

(b) $3\frac{1}{2}$

(c) $3\frac{1}{3}$

(d) 2

(e) 3

4. A company produces and sells q units of its product. If the variable cost is \$4/unit, fixed costs are \$4800 and the selling price is \$28/unit, find the number of units the company **must** produce to split even (i.e., zero profit).

(a) 200 units (correct)

(b) 100 units

(c) 150 units

(d) 175 units

(e) 125 units

5. A person wishes to deposit a total of \$10,000 in two accounts. The savings account pays yearly interest of 4% and fixed certificates of deposit pay a yearly interest rate of 7%. How much should the person deposit in each account so that he gets a total of \$502 interest at the end of the year?

(a) Saving Account $= 6600$, Certificate of Deposit $= 3400$ (correct)

(b) Saving Account $= 3400$, Certificate of Deposit $= 6600$

(c) Saving Account $= 3000$, Certificate of Deposit $= 7000$

(d) Saving Account $= 7000$, Certificate of Deposit $= 3000$

(e) Saving Account $= 6000$, Certificate of Deposit $= 4000$

6. The cost of publishing each copy of a magazine is \$1.75. The revenue from dealers is \$1.60 for each copy. The amount received for advertising is \$10% of the amount received for all magazines sold beyone $1,000$. Find the smallest number of copies that must be sold to break even.

(a) $16,000$ copies (correct)

(b) $10,000$ copies

(c) $10,00$ copies

(d) $16,00$ copies

(e) $15,000$ copies

7. Which of the following statement(s) is **True**?

I Slope is not defined for a vertical line.

II A line that falls from left to right has a negative slope.

III A line with slope $\frac{1}{3}$ is more nearly horizontal than a line with slope $\frac{2}{3}$.

(a) I, II and III (correct)

(b) I only

(c) II only

(d) I and II only

(e) I and III only

8. A bank loaned \$3320 to a company for the development of two products. If the laon for product A was \$1520 more than the other product B, how much was loaned for each product?

(a) Loan for product $A = \$2420$, Loan for product $B = \$900$ (correct)

(b) Loan for product $A = \$900$, Loan for product $B = \$2420$

(c) Loan for product $A = \$1520$, Loan for product $B = \$900$

(d) Loan for product $A = \$1520$, Loan for product $B = \$800$

(e) Loan for product $A = \$800$, Loan for product $B = \$1520$

9. A company produces a product at a cost of \$6 per unit. If fixed costs are \$20,000 and each unit sells at \$8, **at least** how many units must be sold in order to earn a profit?

(a) 10,001 (correct)

(b) 8000

(c) 15000

(d) 9000

(e) 1001

10. Suppose a company offers you a sales position with your choice of two methods of determining your early salary. One method pays \$15,000 plus a bonus of 3% of your yearly sales. The other method pays a straight 13% commission of your sales. For what yearly sales level is it better to choose the first method?

(a) yearly sales under \$150,000 (correct)

(b) yearly sales equal to \$150,000

(c) yearly sales above \$150,000

(d) yearly sales $\leq$ \$150,00

(e) yearly sales $\geq$ \$150,00

11. The equation of the line passing through $(4, -5)$ and perpendicular to the line $3y = -\dfrac{2x}{5} + 3$ is

(a) $y = \dfrac{15}{2}x - 35$ (correct)

(b) $y = -\dfrac{15}{2}x - 35$

(c) $y = \dfrac{15}{2}x - 4$

(d) $y = \dfrac{15}{2}x - 25$

(e) $y = \dfrac{15}{2}x - 30$

12. Suppose that consumers will demand 40 units of a product when the price is \$12.75 per unit and 25 units when the price is \$18.75 each. Assuming that the relationship between price and number of units is linear. Find the price per unit when 35 units are demanded

(a) \$14.75 (correct)

(b) \$10.75

(c) \$18.75

(d) \$14

(e) \$14.25

13. A company has taxable income of \$312,000. The federal tax is 25% of that portion left after the state tax has been paid. The state tax is 10% of that portion left after the federal tax has been paid. Then the state tax is

(a) \$24,000 (correct)
(b) \$72,000
(c) \$20,000
(d) \$70,000
(e) \$42,000

14. Let $p = \frac{4}{100}q + 3$ be the supply equation for a manufacturer's product, and suppose the demand equation is $p = -\frac{6}{100}q + 13$. If a tax is \$1.0 per unit is to be imposed on the manufacturer then which of the following statement is **True**?

(a) Total revenue of the manufacturer is decreased by \$16 after tax. (correct)
(b) Total revenue of the manufacturer is increased by \$16 after tax.
(c) The price per unit is decreased after imposing the tax.
(d) The equilibrium quantity is increased from $q = 80$ to $q = 90$
(e) The equilibrium price is increased from $p = 20$ to $q = 20.5$

15. The point of intersections of the circle $x^2 + y^2 = 5$ and the line $y = 3x - 5$ are

(a) $(1, -2)$ and $(2, 1)$ (correct)

(b) $(1, -1)$ and $(2, 2)$

(c) $(1, 2)$ and $(2, -1)$

(d) $(1, 1)$ and $(2, -2)$

(e) $(-2, 1)$ and $(1, 2)$

16. The row reduced form of $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 2 & 2 \\ 1 & 0 & 1 \end{bmatrix}$ is

(a) $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ (correct)

(b) $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(d) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(e) $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

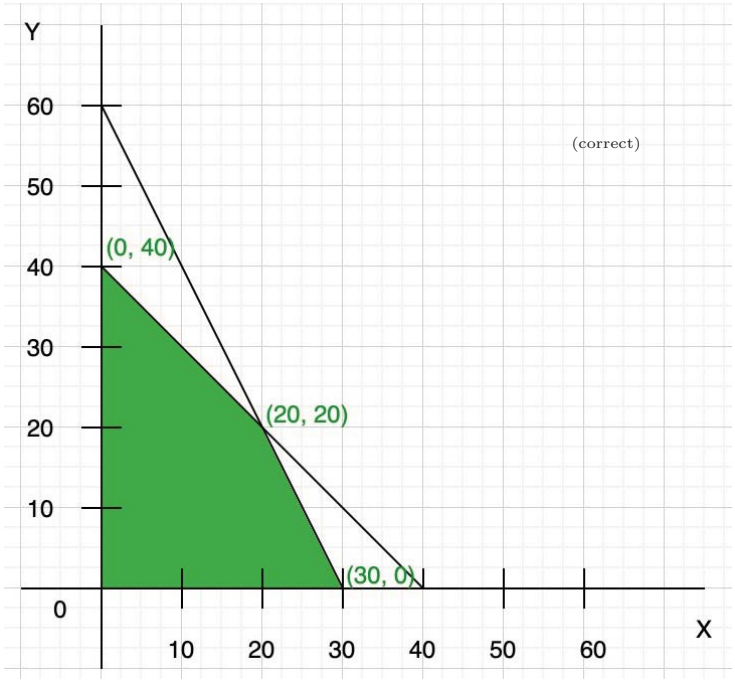
17. The point $(x, 3)$ satisfies the inequality, $-5x - 2y \leq 13$. The smallest possible integer value of x is

(a) -3 (correct)
(b) -2
(c) -1
(d) 1
(e) 0

18. How many points with integer coordinates lie in the feasible region defined by $3x + 4y \leq 12$, $x \geq 0$ and $y \geq 1$?

(a) 6 (correct)
(b) 4
(c) 5
(d) 7
(e) 8

19. The shaded region indicated in the diagram is described by the following inequalities.



(a) $x + y \leq 40,\ 2x + y \leq 60,\ x \geq 0,\ y \geq 0.$ (correct)

(b) $x + y \leq 40,\ 2x + y \leq 60.$

(c) $x + y \leq 40,\ 2x + y \leq 60,\ x \geq 0.$

(d) $x + y \leq 40,\ 2x + y \geq 60,\ x \geq 0,\ y \geq 0.$

(e) $x + y \leq 40,\ 2x + y \geq 60.$

20. A firm wants to determine how many units of each of two products (products D and E) they should produce to make the most money. The profit in the manufacture of a unit of product D is \$100 and the profit in the manufacture of a unit of product E is \$87. The firm is limited by its total available labor hours and total available machine hours. The total labor hours per week are 4,000. Product D takes 5 hours per unit of labor and product E takes 7 hours per unit. The total machine hours are 5,000 per week. Product D takes 9 hours per unit of machine time and product E takes 3 hours per unit. Which of the following is one of the constraints for this linear program?

(a) $9D + 3E \leq 5000$ (correct)

(b) $9D + 3E \geq 4000$

(c) $5D + 7E \leq 5000$

(d) $5D + 9E \leq 4000$

(e) $5D + 7E = 4000$