

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 beyond 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 loan 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 $3y = -\frac{2x}{5} + 3$ is

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

(correct)

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

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

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

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

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 $(2, 1)$
- (b) $(1, -1)$ and $(2, 2)$
- (c) $(1, 2)$ and $(2, -1)$
- (d) $(1, 1)$ and $(2, -2)$
- (e) $(-2, 1)$ and $(1, 2)$

(correct)

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

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

(correct)

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

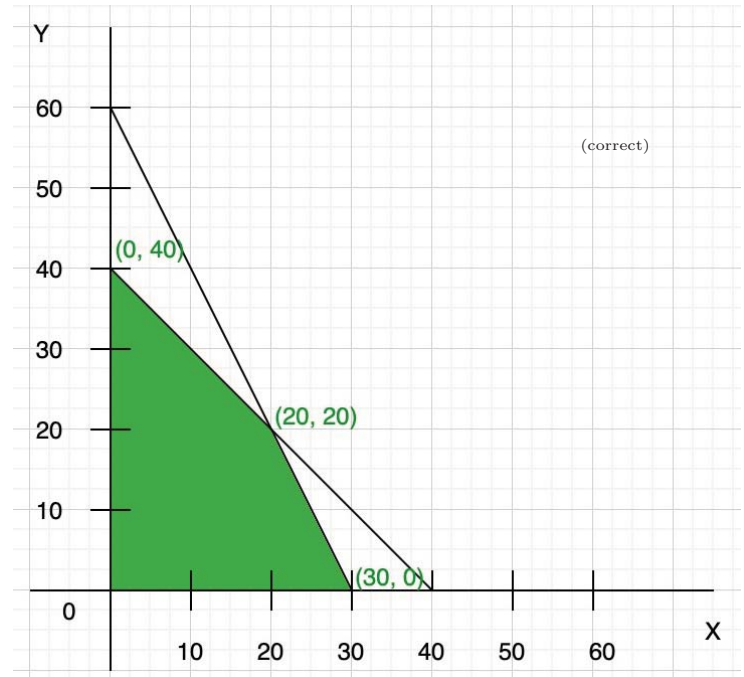
(c) 5

(d) 7

(e) 8

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

- (a) $x + y \leq 40$, $2x + y \leq 60$,
 $x \geq 0$, $y \geq 0$.
- (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) $9D + 3E \leq 5000$
- (b) $9D + 3E \geq 4000$
- (c) $5D + 7E \leq 5000$
- (d) $5D + 9E \leq 4000$
- (e) $5D + 7E = 4000$

(correct)