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**GOOD LUCK!**

1.  a  b  c  d  e

2.  a  b  c  d  e

3.  a  b  c  d  e

4.  a  b  c  d  e

5.  a  b  c  d  e

6.  a  b  c  d  e

7.  a  b  c  d  e

8.  a  b  c  d  e

9.  a  b  c  d  e

10.  a  b  c  d  e

11.  a  b  c  d  e

12.  a  b  c  d  e

13.  a  b  c  d  e

14.  a  b  c  d  e

15.  a  b  c  d  e

16.  a  b  c  d  e

17.  a  b  c  d  e

18.  a  b  c  d  e

19.  a  b  c  d  e

20.  a  b  c  d  e

For grading use:

Number Correct	
	(out of 20 problems)

Total	
	(out of 100 points)

Name: \_\_\_\_\_

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**Multiple Choice Questions**

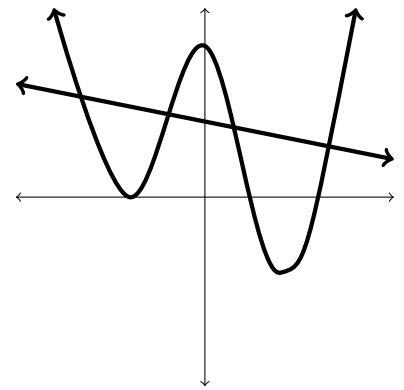
*Show all your work on the page where the question appears.  
Clearly mark your answer both on the cover page on this exam  
and in the corresponding questions that follow.*

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1. The graph of two equations is shown below. Determine the number of solutions for the system of equations.

**Possibilities:**

- (a) 4
- (b) 0
- (c) 3
- (d) 2
- (e) 1



- 
2. Use the substitution method to find all solutions of the system of equations.

$$\begin{aligned}x + y^2 &= 46 \\ y - x &= -4\end{aligned}$$

**Possibilities:**

- (a)  $(x = 10, y = 6)$  only
  - (b)  $(x = -3, y = -7)$  only
  - (c)  $(x = -3, y = 7)$  and  $(x = 11, y = -7)$
  - (d)  $(x = -3, y = -7)$  and  $(x = 10, y = 6)$
  - (e) No real solutions
-

- 
3. Suppose you are solving the system of equations below using the substitution method. You solve for  $y$  in the first equation and substitute it into the second equation. What equation must you solve then?

$$\begin{aligned}8x^7 + y &= 5 \\4x^9 + 3y &= 6\end{aligned}$$

**Possibilities:**

- (a)  $4(\sqrt[7]{5 - 8x^7})^9 + 3y = 6$
- (b)  $4x^9 + 3(\sqrt[7]{5 - y}) = 6$
- (c)  $4x^9 + 3(5 - 8x^7) = 6$
- (d)  $4x^9 + 3(\sqrt[7]{5 - 8x^7}) = 6$
- (e)  $4(5 - 8x^7)^9 + 3y = 6$

- 
4. Use the elimination method to solve the system. The multiple choice problem only asks you for  $y$ .

$$\begin{aligned}29x + 17y &= 218 \\29x + 16y &= 212\end{aligned}$$

**Possibilities:**

- (a) Every solution has  $y = \frac{6}{29}$
- (b) Every solution has  $y = 6$
- (c) Every solution has  $y = 4$
- (d) Every solution has  $y = -17$
- (e) Every solution has  $y = \frac{6}{17}$

---

5. Use substitution to solve the system.

$$\begin{aligned}5x + 3y &= 13 \\4x + 2y &= 29\end{aligned}$$

**Possibilities:**

- (a)  $x = -\frac{93}{2}, y = \frac{61}{2}$
- (b)  $x = 152, y = 110$
- (c)  $x = \frac{61}{2}, y = -\frac{93}{2}$
- (d)  $x = -\frac{1}{76}, y = -\frac{1}{55}$
- (e)  $x = \frac{13}{5}, y = \frac{29}{4}$

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6. Use the elimination method to find all solutions of the system of equations.

$$\begin{cases} \frac{37}{x} + \frac{22}{y} = 123 \\ \frac{17}{x} + \frac{11}{y} = 58 \end{cases}$$

**Possibilities:**

- (a)  $(x = 37, y = 22)$  ,  $(x = -37, y = 22)$  ,  $(x = 17, y = 11)$  , and  $(x = -17, y = -11)$
- (b)  $\left(x = \frac{3}{7}, y = \frac{3}{5}\right)$  only
- (c)  $(x = 37, y = 22)$  and  $(x = 17, y = 11)$
- (d)  $(x = -37, y = 22)$  and  $(x = -17, y = 11)$
- (e)  $\left(x = \frac{3}{7}, y = \frac{3}{5}\right)$  and  $\left(x = -\frac{3}{7}, y = -\frac{3}{5}\right)$

- 
7. Use algebraic, graphical, or numerical methods to find all real solutions of the equation, approximating when necessary to four decimal places.

$$\frac{3x}{x - 20} = 5$$

**Possibilities:**

- (a)  $x = 50.0000$
- (b)  $x = 50.1317$
- (c)  $x = 50.2634$
- (d)  $x = 50.3951$
- (e)  $x = 50.5268$

- 
8. Find an equation that helps solve for the worker's old salary, call it  $x$ , in the following problem:  
A worker gets a 5.35% pay raise and now makes \$1350 per month. What was the worker's old salary?

**Possibilities:**

- (a)  $x = 1350 - 5.35$
- (b)  $5.35x = 1350$
- (c)  $x = (5.35)(1350)$
- (d)  $0.0535x = 1350$
- (e)  $x + 0.0535x = 1350$

- 
9. You have already invested \$700 in a stock with an annual return of 10%. How much of an additional \$1,250 should be invested at 20% and how much at 5% so that the total return on the entire \$1,950 is 15%?

What equations should be solved if  $x$  is the amount of money invested at 20% and  $y$  is the amount of money invested at 5%?

**Possibilities:**

(a)  $\left\{ \begin{array}{l} x = .20(1250) \\ y = .05(700) \end{array} \right\}$

(b)  $\left\{ \begin{array}{l} .05x + .20y = .10(1250) \\ .20x + .05y = .15(1950) \end{array} \right\}$

(c)  $\left\{ \begin{array}{l} x + y = 700 \\ .20x + .05y = .15(1950) \end{array} \right\}$

(d)  $\left\{ \begin{array}{l} 700 + x + y = 1950 \\ .10(700) + .20x + .05y = .15(1950) \end{array} \right\}$

(e)  $\left\{ \begin{array}{l} .15 + x + y = 1950 \\ 1250 + .20x + .05y = .10(700) \end{array} \right\}$

- 
10. A concrete walk of uniform width is to be built around a giant circular pool. The radius of the pool is 18 meters, and enough concrete is available to cover  $64.09\pi$  square meters (approximately). If all the concrete is to be used, how wide should the walk be (approximately)? Choose the closest answer.

**Possibilities:**

- (a) 46.1 meters wide  
(b) 18 meters wide  
(c) 9.99 meters wide  
(d) 1.7 meters wide  
(e) 3.56 meters wide
-

- 
11. Find the equilibrium price. In the supply and demand equations,  $p$  is price (in dollars) and  $x$  is quantity (in thousands). Please round your answer to the nearest hundredth (the nearest cent).

$$\begin{aligned}\text{Supply: } p &= 8x - 7 \\ \text{Demand: } p &= -4x + 9\end{aligned}$$

**Possibilities:**

- (a)  $p = \$1.33$
- (b)  $p = \$3.66$
- (c)  $p = \$4$
- (d)  $p = \$6$
- (e)  $p = \$2$

- 
12. A radiator contains 4 quarts of fluid, 25% of which is antifreeze. How much fluid should be drained and replaced with pure (100%) antifreeze so that the new mixture is 65% antifreeze?

**Possibilities:**

- (a) 2.13 quarts drained and replaced
- (b) 2.6 quarts drained and replaced
- (c) 1 quarts drained and replaced
- (d) 6.4 quarts drained and replaced
- (e) 4 quarts drained and replaced

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13. Solve the inequality. Answer in interval notation.

$$6x + 18 \leq 5x + 20$$

**Possibilities:**

- (a)  $[2, \infty)$
- (b)  $[3, 4]$
- (c)  $(-\infty, 2]$
- (d)  $(-\infty, \infty)$
- (e)  $(-\infty, 6] \cup [18, \infty)$

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14. A business executive is considering two options for leasing a car. The first option is \$355 per month, but the first month costs \$90 extra. The second option is \$370 per month with no extra cost for the first month. The business executive wants to know which option is cheapest based on how many months they plan on leasing the car. Which choice below most accurately describes the situation?

**Possibilities:**

- (a) The first option is cheaper if the lease is 14 months or shorter, the second option is cheaper if the lease is 16 months or longer, and the two options are the same price if the lease is exactly 15 months
- (b) The first option is cheaper if the lease is 16 months or longer, the second option is cheaper if the lease is 14 months or shorter, and the two options are the same price if the lease is exactly 15 months
- (c) Both options cost the same regardless of the length of the lease.
- (d) The first option is cheaper if the lease is 7 months or longer, the second option is cheaper if the lease is 5 months or shorter, and the two options are the same price if the lease is exactly 6 months
- (e) The first option is cheaper if the lease is 5 months or shorter, the second option is cheaper if the lease is 7 months or longer, and the two options are the same price if the lease is exactly 6 months



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15. Solve the inequality. Express your answer in interval notation.

$$\left| \frac{8}{9} + \frac{1}{9}x \right| \leq \frac{4}{9}$$

**Possibilities:**

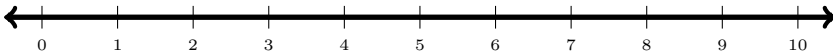
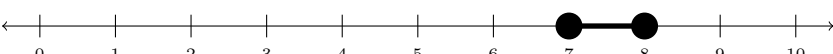
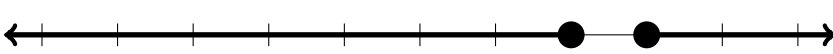


- (a)  $[0, 12]$
- (b)  $[\frac{4}{9}, \frac{8}{9}]$
- (c)  $[4, 12]$
- (d)  $[0, \frac{4}{9}]$
- (e)  $[-12, -4]$

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16. Solve the inequality. Answer by choosing the correct number line.

$$0 \leq (x - 8)(x - 7)^2$$

**Possibilities:**

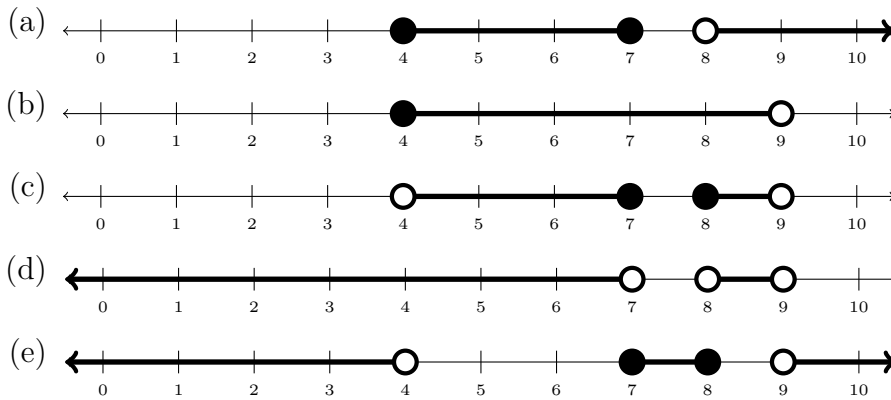
- (a) 
- (b) 
- (c) 
- (d) 
- (e) 

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17. Solve the inequality. Answer by choosing the correct number line.

$$0 \leq \frac{(x - 8)(x - 7)}{(x - 4)(x - 9)}$$

**Possibilities:**

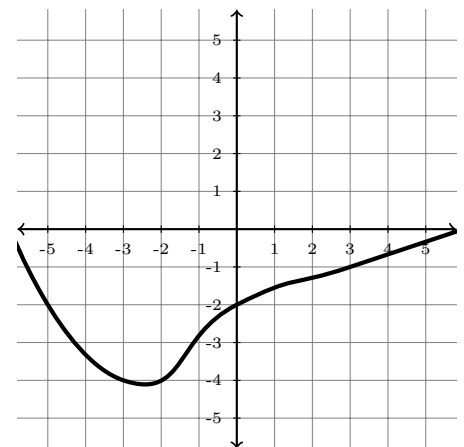


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18. Find  $f(-3)$  from the graph of  $y = f(x)$ .

**Possibilities:**

- (a)  $f(-3) = -2$
- (b)  $f(-3) = 0$
- (c)  $f(-3) = -4$
- (d)  $f(-3) = 7$
- (e)  $f(-3) = -3$



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19. Find the indicated value of the function when  $x = \sqrt{3} + 7$ .

$$f(x) = \sqrt{x+4} - x - 9$$

$$f(\sqrt{3} + 7) =$$

**Possibilities:**

(a)  $\sqrt{\sqrt{3} + 11} - \sqrt{3} - 16$

(b)  $\sqrt{11} - 16$

(c)  $\sqrt{\sqrt{3} + 11} - \sqrt{3} - 2$

(d)  $-5$

(e)  $\sqrt{14} - \sqrt{3} - 16$

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20. Let  $f(x) = 2x^2 + 8$ . Find  $\frac{f(x+h) - f(x)}{h}$  if  $h \neq 0$ . Simplify your answer.

**Possibilities:**

(a)  $\frac{2h^2 + 8}{h}$

(b)  $4x + 2h$

(c)  $16$

(d)  $2x + 8h$

(e)  $\frac{h + 16}{h}$

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