

Do not remove this answer page — you will turn in the entire exam. You have two hours to do this exam. No books or notes may be used. You may use an ACT-approved calculator during the exam, but NO calculator with a Computer Algebra System (CAS), networking, or camera is permitted. Absolutely no cell phone use during the exam is allowed.

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**GOOD LUCK!**

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For grading use:

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	(out of 20 problems)

Total	
	(out of 100 points)

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**Multiple Choice Questions**

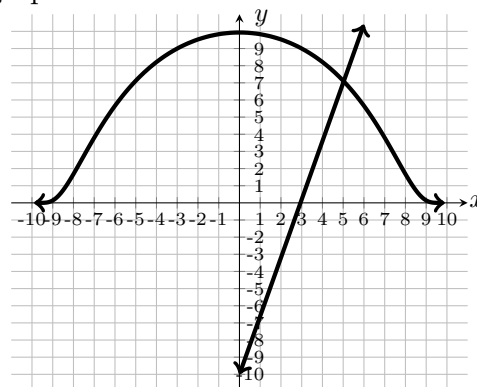
*Show all your work on the page where the question appears.  
Clearly mark your answer both on the cover page on this exam  
and in the corresponding questions that follow.*

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1. Determine the solutions to the system of equations in the following graph.

**Possibilities:**

- (a)  $(x = 0, y = -10)$  only
- (b)  $(x = -9, y = 0)$  and  $(x = 9, y = 0)$
- (c)  $(x = 0, y = -10)$  and  $(x = 0, y = 10)$
- (d)  $(x = 10, y = -10)$  only
- (e)  $(x = 5, y = 7)$  only



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

$$\begin{aligned}x + y^2 &= 26 \\y - x &= -6\end{aligned}$$

**Possibilities:**

- (a)  $(x = 1, y = 5)$  and  $(x = 11, y = -5)$
  - (b)  $(x = 1, y = -5)$  only
  - (c)  $(x = 10, y = 4)$  only
  - (d)  $(x = 1, y = -5)$  and  $(x = 10, y = 4)$
  - (e) No real solutions
-

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

$$19x + 23y = 214$$

$$19x + 22y = 208$$

**Possibilities:**

(a) Every solution has  $y = \frac{6}{19}$

(b) Every solution has  $y = -23$

(c) Every solution has  $y = 4$

(d) Every solution has  $y = \frac{6}{23}$

(e) Every solution has  $y = 6$

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4. 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?

$$5x^6 + y = 2$$

$$4x^8 + 9y = 3$$

**Possibilities:**

(a)  $4x^8 + 9(2 - 5x^6) = 3$

(b)  $4\left(\sqrt[6]{2 - 5x^6}\right)^8 + 9y = 3$

(c)  $4x^8 + 9\left(\sqrt[6]{2 - y}\right) = 3$

(d)  $4x^8 + 9\left(\sqrt[6]{2 - 5x^6}\right) = 3$

(e)  $4(2 - 5x^6)^8 + 9y = 3$

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

$$\begin{cases} \frac{29}{x} + \frac{10}{y} = 201 \\ \frac{13}{x} + \frac{5}{y} = 92 \end{cases}$$

**Possibilities:**

(a)  $(x = 29, y = 10)$  ,  $(x = -29, y = 10)$  ,  $(x = 13, y = 5)$  , and  $(x = -13, y = -5)$

(b)  $\left(x = \frac{3}{17}, y = \frac{3}{11}\right)$  and  $\left(x = -\frac{3}{17}, y = -\frac{3}{11}\right)$

(c)  $(x = -29, y = 10)$  and  $(x = -13, y = 5)$

(d)  $\left(x = \frac{3}{17}, y = \frac{3}{11}\right)$  only

(e)  $(x = 29, y = 10)$  and  $(x = 13, y = 5)$

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6. Find all distinct, real solutions  $(x, y)$  to:

$$\begin{aligned} x + y &= 9 \\ x^2 - y^2 &= \sqrt{19} \end{aligned}$$

**Possibilities:**

(a)  $\left(x = \frac{9 + \sqrt{19}}{2}, y = \frac{9 - \sqrt{19}}{2}\right)$

(b)  $\left(x = \frac{81 + \sqrt{19}}{18}, y = \frac{81 - \sqrt{19}}{18}\right)$

(c)  $\left(x = \frac{9 + \sqrt{19}}{38}, y = \frac{9 - \sqrt{19}}{38}\right)$

(d)  $\left(x = \frac{171 + \sqrt{19}}{18}, y = \frac{171 - \sqrt{19}}{18}\right)$

(e)  $\left(x = \frac{-9 \pm \sqrt{19}}{2}, y = \frac{-19 \pm \sqrt{9}}{2}\right)$

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

$$\frac{7}{(x+2)^7 + 19x} = \frac{7}{32 + (x+2)^7}$$

**Possibilities:**

- (a)  $x = 1.6791$
- (b)  $x = 1.6808$
- (c)  $x = 1.6825$
- (d)  $x = 1.6842$
- (e)  $x = 1.6859$

- 
8. A corner lot has dimensions 50 by 44 yards. The city plans to take a strip of uniform width along the two sides bordering the streets to widen these roads. How wide should the strip be if the remainder of the lot is to have an area of 1927 square yards?

Which equation should you solve in order to find the answer? The variable  $x$  represents the width of the strip in yards.

**Possibilities:**

- (a)  $(50 - x)(44 - x) = 1927$
- (b)  $(50)(44) - x^2 = 1927$
- (c)  $x^2 = 1927$
- (d)  $(50)(44) = x$
- (e)  $x = 2200 - 1927$

- 
9. A concrete walk of uniform width is to be built around a giant circular pool. The radius of the pool is 15 meters, and enough concrete is available to cover  $50.56\pi$  square meters (approximately). If all the concrete is to be used, how wide should the walk be (approximately)? Choose the closest answer.

**Possibilities:**

- (a) 35.6 meters wide
- (b) 1.6 meters wide
- (c) 15 meters wide
- (d) 7.89 meters wide
- (e) 3.37 meters wide

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10. 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).

$$\begin{aligned}\text{Supply: } p &= 5x - 6 \\ \text{Demand: } p &= -4x + 8\end{aligned}$$

**Possibilities:**

- (a)  $p = \$1.78$
  - (b)  $p = \$1.56$
  - (c)  $p = \$4.50$
  - (d)  $p = \$1$
  - (e)  $p = \$2$
- 
11. The cost of a nut mix depends on how many pounds of each type of nut it contains: peanuts cost \$3.00 per pound and cashews cost \$4.50 per pound. How many pounds of peanuts and cashews should be added to 5 pounds of \$4.00 per pound mixed nuts to get 25 pounds of \$3.50 per pound mixed nuts?

**Possibilities:**

- (a) 16.67 lbs of peanuts and 8.33 lbs of cashews
  - (b) 5.00 lbs of peanuts and 15.00 lbs of cashews
  - (c) 15.00 lbs of peanuts and 5.00 lbs of cashews
  - (d) 10.00 lbs of peanuts and 10.00 lbs of cashews
  - (e) 8.33 lbs of peanuts and 16.67 lbs of cashews
-

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

$$|x - 5| \leq 6$$

**Possibilities:**

- (a)  $[0, 6]$
- (b)  $[-1, 11]$
- (c)  $[5, 6]$
- (d)  $[0, 5]$
- (e)  $[0, 11]$

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13. Solve the inequality. Answer in interval notation.

$$10x + 15 > 4x + 12$$

**Possibilities:**

- (a)  $(-\infty, \infty)$
- (b)  $[-\frac{1}{2}, \infty)$
- (c)  $(-\frac{1}{2}, \infty)$
- (d)  $(-\infty, 10] \cup [15, \infty)$
- (e)  $[\frac{3}{2}, 3]$

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14. A rectangle must have a length of 22 inches and a width of at most 11 inches. How much area can this rectangle have?

**Possibilities:**

- (a) at least 11 square inches
- (b) at most 2 square inches
- (c) at least 2 square inches
- (d) at least 242 square inches
- (e) at most 242 square inches

15. A business executive is considering two options for leasing a car. The first option is \$400 per month, but the first month costs \$60 extra. The second option is \$410 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 9 months or shorter, the second option is cheaper if the lease is 11 months or longer, and the two options are the same price if the lease is exactly 10 months
- (b) The first option is cheaper if the lease is 11 months or longer, the second option is cheaper if the lease is 9 months or shorter, and the two options are the same price if the lease is exactly 10 months
- (c) 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
- (d) Both options cost the same regardless of the length of the lease.
- (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

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

$$(x - 2)(x - 5)^2(x - 8) > 0$$

**Possibilities:**

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



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17. Solve the inequality. Answer in interval notation.

$$\frac{x - 5}{x - 6} \leq 0$$

**Possibilities:**

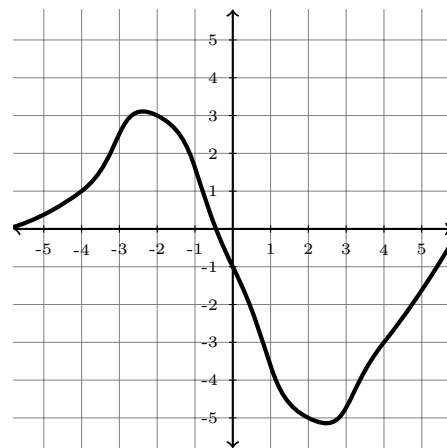
- (a)  $(-\infty, 6]$
- (b)  $[5, 6)$
- (c)  $[5, 6]$
- (d)  $(-\infty, 5] \cup [6, \infty)$
- (e)  $(-\infty, 5]$

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18. Find  $f(-2)$  from the graph of  $y = f(x)$ .

**Possibilities:**

- (a)  $f(-2) = 0$
- (b)  $f(-2) = 7$
- (c)  $f(-2) = -2$
- (d)  $f(-2) = -1$
- (e)  $f(-2) = 3$



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19. Let the piecewise function  $g(x)$  be given by:

$$g(x) = \begin{cases} x^2 & \text{if } x \leq 3 \\ 5x + 7 & \text{if } x > 3 \end{cases}$$

Evaluate  $g(4)$

**Possibilities:**

(a)  $g(4) = -\frac{7}{5}$

(b)  $g(4) = 4$

(c)  $g(4) = 27$

(d)  $g(4) = 16$

(e)  $g(4) = 0$

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20. Let  $f(x) = 2x^2 - 5$ . Find  $\frac{f(x+h) - f(x)}{h}$  if  $h \neq 0$ . Simplify your answer.

**Possibilities:**

(a)  $4x + 2h$

(b)  $2x - 5h$

(c)  $\frac{2h^2 - 5}{h}$

(d) 1

(e)  $\frac{h - 10}{h}$

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