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 a graphing calculator during the exam, but NO calculator with a Computer Algebra System (CAS) or a QWERTY keyboard is permitted. Absolutely no cell phone use during the exam is allowed.

The exam consists of multiple choice and short answer questions. Record your answers on this page. For each multiple choice question, you will need to fill in the box corresponding to the correct answer. For example, if (a) is correct, you must write

| a | b | c | d | e |

Do not circle answers on this page, but please do circle the letter of each correct response in the body of the exam. It is your responsibility to make it CLEAR which response has been chosen. You will not get credit unless the correct answer has been marked on both this page and in the body of the exam.

GOOD LUCK!

1. | a | b | c | d | e | 11. | a | b | c | d | e |

2. | a | b | c | d | e | 12. | a | b | c | d | e |

3. | a | b | c | d | e | 13. | a | b | c | d | e |

4. | a | b | c | d | e | 14. | a | b | c | d | e |

5. | a | b | c | d | e | 15. [   ]

6. | a | b | c | d | e | 16. $Y =$ [   ]

7. | a | b | c | d | e | 17. [   ]

8. | a | b | c | d | e | 18. [   ]

9. | a | b | c | d | e | 19. [   ]

10. | a | b | c | d | e | 20. [   ]

For grading use:

Total	
	(out of 100 pts)

1

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

1. A plane flies from Austin, Texas, to Cleveland, Ohio, a distance of 1200 miles. Bad weather forces the plane to land in Dallas (about 200 miles from Austin), remain overnight (for 8.5 hours), and continue the next day. Let f be the function whose rule is $f(t) =$ distance (in miles) from Austin at time t hours. Determine the most plausible graph of $y = f(t)$ under the given circumstance.

   Possibilities:

   (a)

   (b)

   (c)

   (d)

   (e)
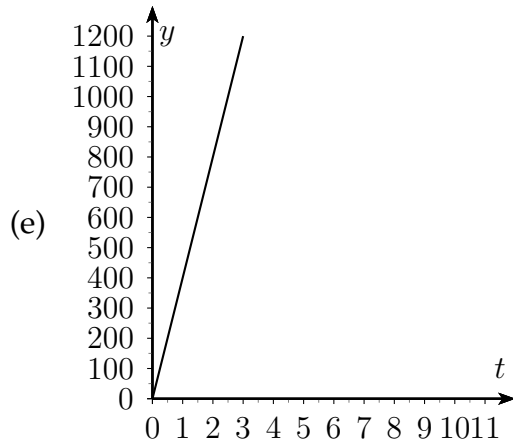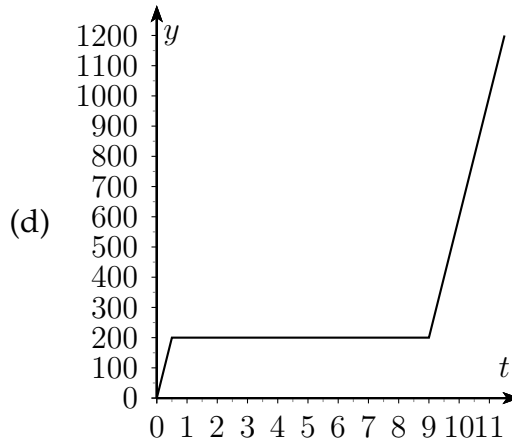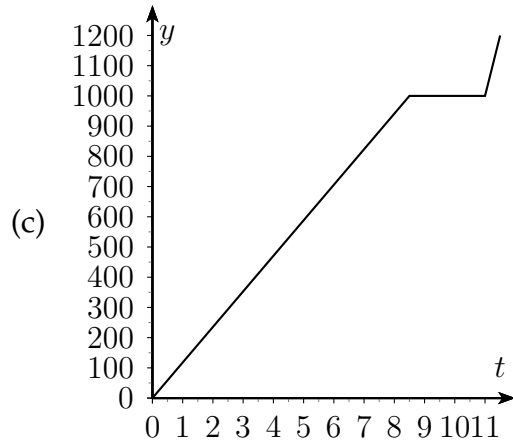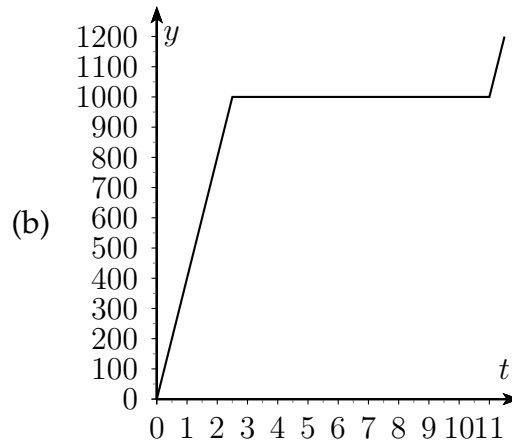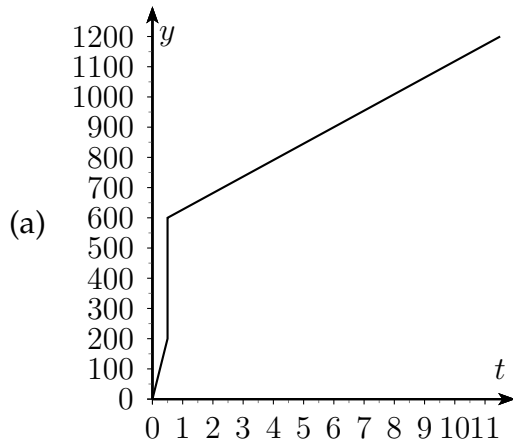
2. Let $f(x) = \sqrt{2x - 10}$. Find the domain of $f(x)$.

Possibilities:

(a) $(-\infty, -5] \cup (5, \infty)$

(b) $[10, \infty)$

(c) $(-10, \infty)$

(d) $[5, \infty)$

(e) $(5, \infty)$

3. Let
$$f(x) = \begin{cases} x^2 & \text{if } x \leq -6 \\ x - 6 & \text{if } -6 < x < 1 \\ 6x & \text{if } x \geq 1 \end{cases}$$
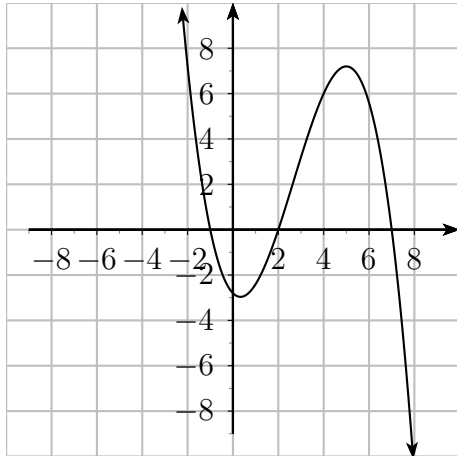
Find $f(1)$.

Possibilities:

(a) 1

(b) -5

(c) 6

(d) $1, -5,$ and 6

(e) None of the above

4. Approximate the solution to $(x - 3)^3 = \dfrac{x}{6}$.

Possibilities:

(a) $x \approx 1.9318$

(b) $x \approx 3.8635$

(c) $x \approx 1.9256$

(d) $x \approx 4.5651$

(e) $x \approx 3.8512$

5. Below is the graph of $y = \dfrac{(2-x)(x+1)(x-7)}{5}$.

Use the graph to solve the inequality.

$$\frac{(2-x)(x+1)(x-7)}{5} \leq 0$$

Possibilities:

(a) $[-1, 2]$

(b) $(-\infty, -1] \cup [2, 7]$

(c) $[-1, 2] \cup [7, \infty)$

(d) $(-\infty, -3] \cup [7, \infty)$

(e) $[-3, 7]$

6. What quantity, x, of a 30% acid solution must be mixed with 1900 mL of a 35% acid solution to produce a 33.8% solution?

Possibilities:

(a) 600 mL

(b) 700 mL

(c) 500 mL

(d) 900 mL

(e) 800 mL

7. Suppose you need to solve a system of equations in which one equation is $y = x^2$ and the other equation represents a line. How many solutions could your system have? Be sure to include ALL solutions that are possible.

Possibilities:

(a) The system could only have 0 or 2 solutions.

(b) The system could only have 0, 1, or infinitely many solutions.

(c) The system could only have 0, 1, or 2 solutions.

(d) The system could only have 1 or 2 solutions.

(e) The system will never have any solutions because the graph of $y = x^2$ is not a line.

8. How many solutions does the system of equations have?

$$\begin{cases} x - 5y = 10 \\ -x + y^2 + 21y = -73 \end{cases}$$

Possibilities:

(a) No solutions

(b) One solution

(c) Two solutions

(d) Four solutions

(e) Infinitely many solutions

9. Let $f(x) = 4x^2 + 6$. Find $\dfrac{f(x + h) - f(x)}{h}$.

Possibilities:

(a) $\dfrac{4h^2 + 6}{h}$

(b) $4h$

(c) $8x + 4h$

(d) 1

(e) $\dfrac{8xh + 4h^2 + 12}{h}$

10. Use the graphing function on your calculator to find the number of solutions to the equation below.

$$x^4 + 2x = x^2 - 1$$

Possibilities:

(a) 0

(b) 1

(c) 2

(d) 3

(e) 4

11. A ball is thrown straight upward at an initial speed of 192 ft/sec. From physics, it is known that after t seconds the ball reaches a height h feet given by the formula

$$h = -16t^2 + 192t.$$
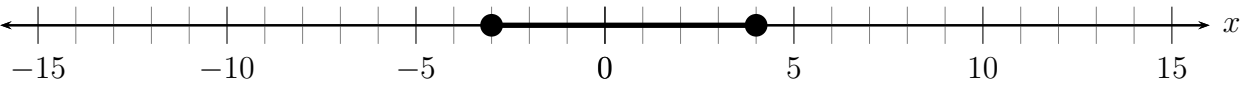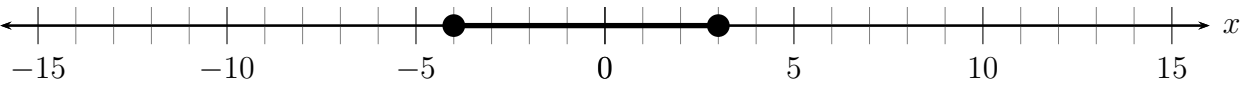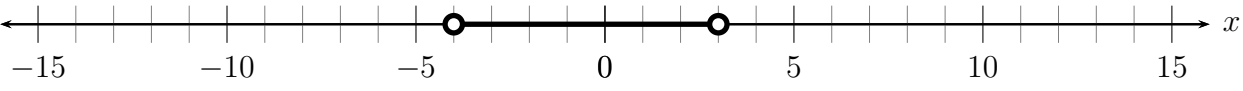
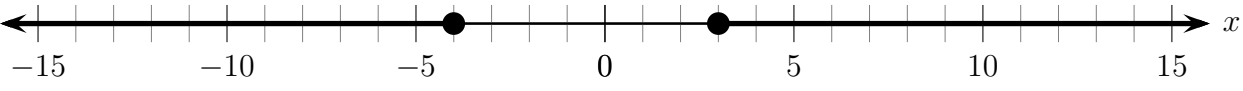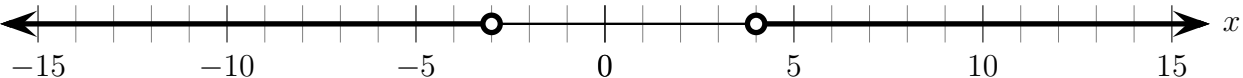When does the ball reach a height of 560 feet?

Possibilities:

(a) At 5 seconds and 7 seconds.

(b) At 4 seconds and 8 seconds.

(c) At 4 seconds and 6 seconds.

(d) At 3 seconds and 7 seconds.

(e) Only at 6 seconds.

12. Solve the inequality and graph the solution set on the real number line.

$$x^2 + x - 12 \le 0$$
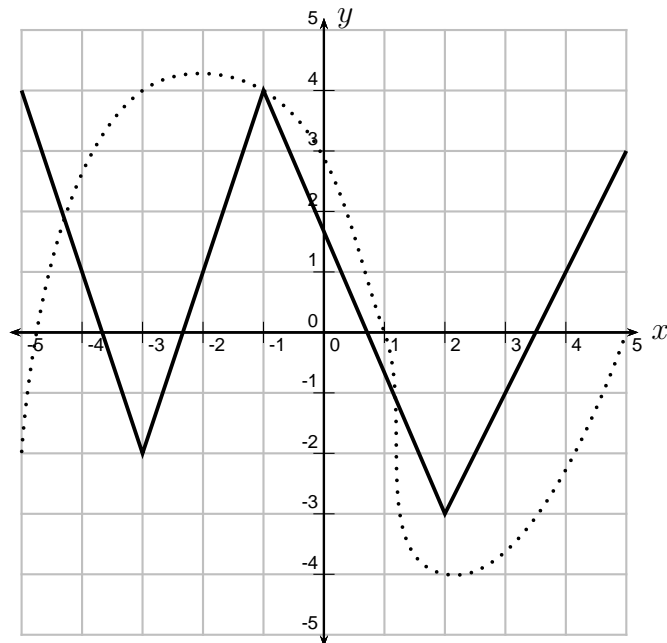
Possibilities:

(a)

(b)

(c)

(d)

(e)

13. Solve the inequality.
$$|x + 6| < 5$$

Possibilities:

(a) $(-11, -1)$
(b) $(-\infty, -11)$
(c) $(-\infty, -5) \cup (5, \infty)$
(d) $(-\infty, -11) \cup (-1, \infty)$
(e) $(-\infty, -1)$

14. In the picture below, the graph of $y = f(x)$ is the solid graph, and the graph of $y = g(x)$ is the dotted graph. Find the true statement.

Possibilities:

(a) $f(5) \geq g(5)$
(b) $f(2) > g(2)$
(c) $f(-3) < g(-3)$
(d) $g(1) = 0$
(e) All of the Above

Short Answer Questions
Show all your work on the page where the question appears.
Clearly indicate your answer both on the cover page of this exam
and in the corresponding questions that follow.

15. A 25 foot ladder rests against a wall. The bottom of the ladder is 7 feet from the wall. If the bottom of the ladder is pulled out 3 feet farther from the wall, how far does the top of the ladder move down the wall? **If you approximate, include at least two decimal places.**

16. Suppose you want to graph $2y + x^2 = 17$ on your graphing calculator. What should you enter into your calculator?

17. Find all the solutions of the system of equations, or state that there are no solutions.

$$\begin{cases} -6x + 4y = -7 \\ -5x + 4y = 6 \end{cases}$$

18. Let $f(x) = x^2 + 3$. Find $f(x + 2)$.

19. Let $f(x) = \dfrac{x^2}{x + 5}$. Find $f(-4)$.

20. Solve the inequality. **Make sure your answer is in interval notation.**

$$13 - 5x > 14$$