
Circle the letter corresponding to your answer. Circle only one answer per question. There is no partial credit on this portion of the exam. Answer the long answer questions on the exam itself. The exam includes 24 problems on 5 sheets of paper (including this cover sheet). You may remove this sheet to record your answers, but make sure that you put your name on both this sheet and the other part of the exam.

1. T F
2. T F
3. T F
4. T F
5. T F
6. T F
7. T F
8. T F
9. T F
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
21. A B C D E

True / False (3 points each). Record all answers on the cover page / answer sheet. There is no partial credit for this portion of the exam. Circle T if the statement is always true and circle F if the statement is sometimes false.

1. T F $-(3 - 5) - (2 - (3^2 - 13)) = 4$
2. T F $x^2 - y = 1$ is a function where x is the input and y is the output.
3. T F $x^2 - y^2 = 16$ is a function where x is the input and y is the output.
4. T F The line $2x + 3y = 12$ has slope $\frac{2}{3}$ and y -intercept $(0, 4)$
5. T F The graph of the function $f(x) = (x + 3)^2$ has vertex $(-3, 0)$ and opens up.
6. T F The lines $4x - 3y = 6$ and $3x + 4y = 8$ are perpendicular.
7. T F The line through $(-1, 4)$ and $(2, 3)$ has equation $y - 4 = \frac{1}{3}(x + 1)$.
8. T F The line $x = 5$ has slope 0.
9. T F The domain of the function $f(x) = \frac{2x}{\sqrt{x-3}}$ is $x \geq 3$
10. T F The line through $(-1, 4)$ and $(2, 3)$ has equation $y - 4 = \frac{1}{3}(x + 1)$.
11. T F The line $y = 5$ has slope 0.
12. T F The function $f(x) = -(x + 2)^2 - 1$ has y -intercept $(0, -1)$
13. T F The break even point is where the profit equals the cost.
14. T F For a linear cost function, the marginal cost is the y -intercept of the function.
15. T F The graph of the quadratic function $f(x) = -6(2 - x)^2 - 5$ has vertex $(2, -5)$ and opens up.

Multiple Choice (4 points each). Record all answers on the cover page / answer sheet. There is no partial credit for this portion of the exam. Circle the letter corresponding to the best answer.

16. The equation $y = x^3 - 1$ has
- A. x -intercepts $(1, 0)$ and $(-1, 0)$ and y -intercept $(0, -1)$
 - B. x -intercepts $(1, 0)$ and $(-1, 0)$ and y -intercept $(0, 1)$
 - C. no x -intercepts and y -intercept $(0, -1)$
 - D. no x -intercepts and y -intercept $(0, 1)$
 - E. None of the above
17. The equation of the line through $(-1, 3)$ perpendicular to the line through $(0, 1)$ and $(2, 3)$ is
- A. $y = x + 1$
 - B. $y = -x + 1$
 - C. $y = -x + 2$
 - D. $y = -x + 4$
 - E. None of the above
18. The vertical line through the point $(4, -3)$ has equation:
- A. $x = 4$
 - B. $x = -3$
 - C. $y = 4$
 - D. $y = -3$
 - E. None of the above
19. The equation $x - 2y = 3$ has
- A. x -intercept $\left(0, -\frac{3}{2}\right)$ and y -intercept $(3, 0)$
 - B. x -intercept $\left(-\frac{3}{2}, 0\right)$ and y -intercept $(0, 3)$
 - C. x -intercept $(0, 3)$ and y -intercept $\left(-\frac{3}{2}, 0\right)$
 - D. x -intercept $(3, 0)$ and y -intercept $\left(0, -\frac{3}{2}\right)$
 - E. None of the above
20. The equation of the line with x -intercept $(-3, 0)$ and y -intercept $(0, 5)$ has equation:
- A. $\frac{5}{3}x + 5$
 - B. $-\frac{5}{3}x + 5$
 - C. $\frac{3}{5}x - 3$
 - D. $-\frac{3}{5}x - 3$
 - E. None of the above

21. Find the linear cost function if the marginal cost is \$120, and 100 items cost \$15,800 to produce.
- A. $C(x) = 120x + 15,800$
 - B. $C(x) = 120x + 3800$
 - C. $C(x) = 3800x + 120$
 - D. $C(x) = 158x + 120$
 - E. none of the above

For the next two problems, consider the following situation:

The owners of a parking lot have determined that their weekly revenue and cost in dollars are given by

$$R(x) = 125x$$

$$C(x) = 100x + 5000$$

where x is the number of long-term parkers.

22. The profit function is
- A. $P(x) = 225x + 5000$
 - B. $P(x) = 25x + 5000$
 - C. $P(x) = 25x - 5000$
 - D. $P(x) = -25x + 5000$
 - E. none of the above

23. The break even point is
- A. 200 units
 - B. \$200
 - C. 0 units
 - D. \$25,000
 - E. none of the above

For the next 4 problems, use the function

$$f(x) = -4x^2 + 8x + 3$$

24. The graph of $f(x)$ is a parabola that opens:
- A. up
 - B. down
 - C. left
 - D. right
 - E. None of the above

25. The x -intercepts are

- A. $(3, 0)$
- B. $(0, 3)$
- C. $\left(1 \pm \frac{\sqrt{7}}{2}, 0\right)$
- D. $\left(0, 1 \pm \frac{\sqrt{7}}{2}\right)$
- E. None of the above

26. The y -intercept is

- A. $(3, 0)$
- B. $(0, 3)$
- C. $\left(1 \pm \frac{\sqrt{7}}{2}, 0\right)$
- D. $\left(0, 1 \pm \frac{\sqrt{7}}{2}\right)$
- E. None of the above

27. The vertex is

- A. $(-1, -7)$
- B. $(1, -7)$
- C. $(-1, 7)$
- D. $(1, 7)$
- E. None of the above

Long Answer. Answer the following questions. No work = no credit.

28. (5 points) State the definition of function.

29. (10 points) If the revenue function for a company is

$$R(x) = 200x - x^2$$

and the cost function is

$$C(x) = 70x + 2200$$

and these equations hold for $0 \leq x \leq 100$, find the break even point.

30. (10 points) Farmer Linton wants to find the best time to take her hogs to market. The current price is 88 cents per pound and her hogs weigh an average of 90 pounds. The hogs gain 5 pounds per week and the market price for hogs is falling each week by 2 cents per pound. How many weeks should Ms. Linton wait before taking her hogs to market in order to receive as much money as possible? At that time, how much money will she get per hog?