

MATH 22

NAME _____

EXAM II

STUDENT NUMBER _____

SAMPLE EXAM

INSTRUCTOR _____

VERSION A

SECTION NUMBER _____

On your scantron, write and bubble your PSU ID, Section Number, and Test Version. Failure to correctly code these items may result in a loss of 5 points on the exam.

On your scantron, bubble letters corresponding to your answers on indicated questions. It is a good idea for future review to circle your answers in the test booklet.

Check that your exam contains 20 questions numbered sequentially.

Answer Questions 1-20 on your scantron.

Each multiple choice question is worth 5 points.

THE USE OF A CALCULATOR, CELL PHONE, OR ANY
OTHER ELECTRONIC DEVICE IS NOT PERMITTED IN THIS
EXAMINATION.

THE USE OF NOTES OF ANY KIND IS NOT PERMITTED
DURING THIS EXAMINATION.

1. Which of the following functions is NOT one-to-one?

a) $y = \sqrt{x}$

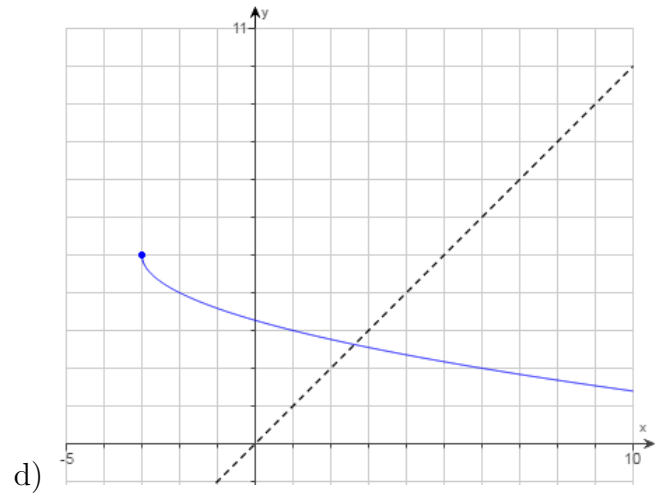
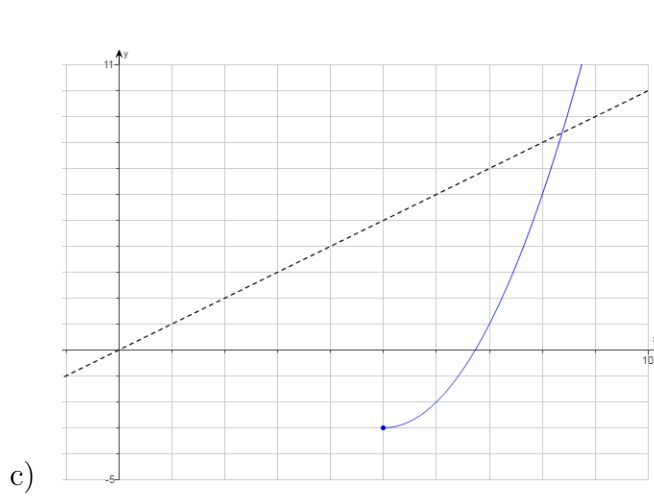
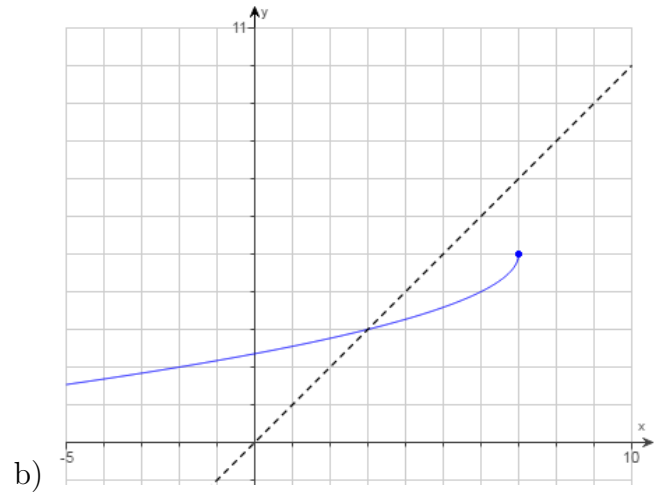
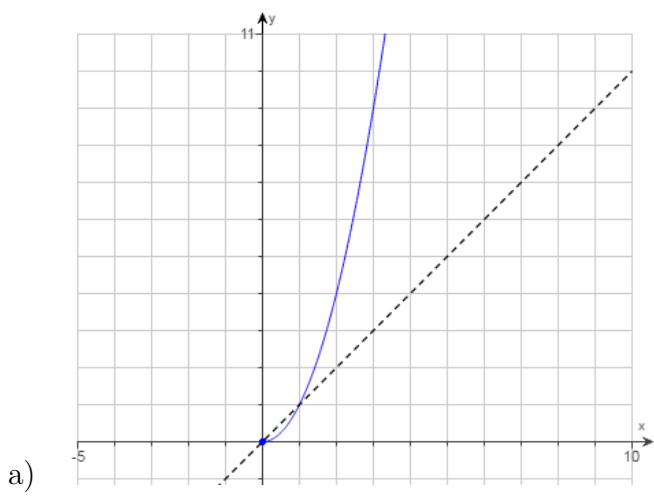
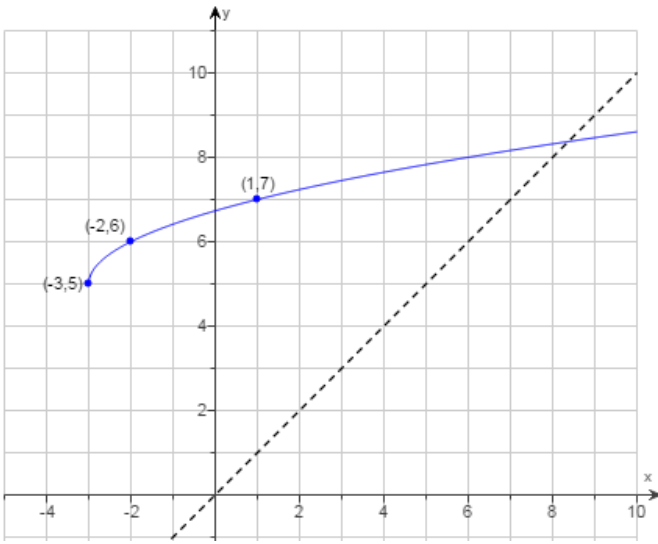
b) $y = x^2, x \geq 1$

c) $y = \frac{1}{x}$

d) $y = \begin{cases} x & \text{if } x \leq 0; \\ x^2 + 1 & \text{if } x > 0. \end{cases}$

e) $y = |x|, x \leq 1$

2. The graph of the function $f(x)$ is given below. Which of the following is the graph of $f^{-1}(x)$?



3. Find the inverse of the function $f(x) = \frac{9x + 7}{7x + 5}$.

a) $f^{-1}(x) = \frac{7x + 5}{9x + 7}$

b) $f^{-1}(x) = \frac{-5x + 7}{7x - 9}$

c) $f^{-1}(x) = \frac{5x - 7}{7x - 9}$

d) $f^{-1}(x) = \frac{9x + 9}{7x + 5}$

e) $f^{-1}(x) = \frac{7x - 9}{-5x + 7}$

4. If $g(x) = \sqrt{x - 3}$, what is the domain of $g^{-1}(x)$?

a) $[3, \infty)$

b) $[0, \infty)$

c) $(-\infty, 0)$

d) $(0, \infty)$

e) $(-\infty, 3)$

5. Determine if the quadratic function $f(x) = 3x^2 - 18x + 31$ has a maximum or minimum value and then find this maximum or minimum value.

a) Maximum at $(4, 0)$

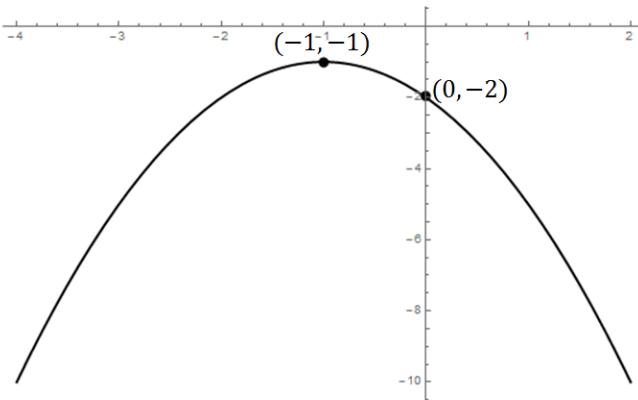
b) Minimum at $(3, 0)$

c) Minimum at $(0, 4)$

d) Maximum at $(4, 3)$

e) Minimum at $(3, 4)$

6. Which quadratic function has the graph given below?



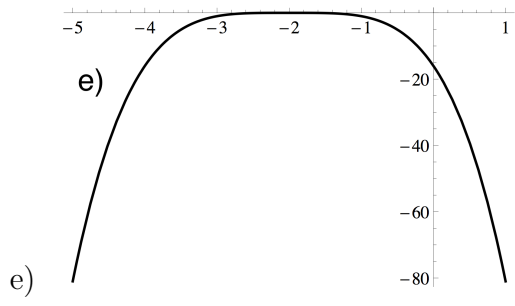
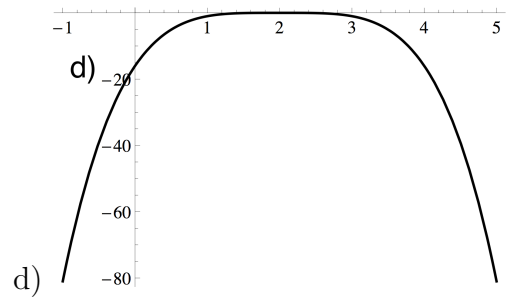
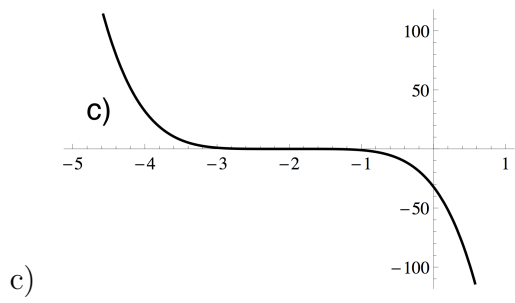
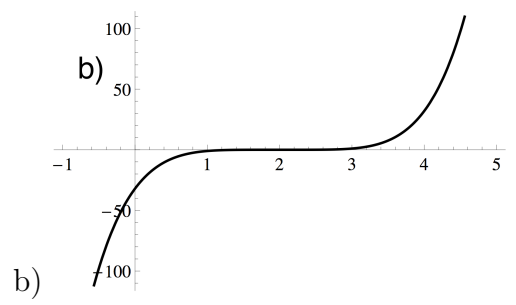
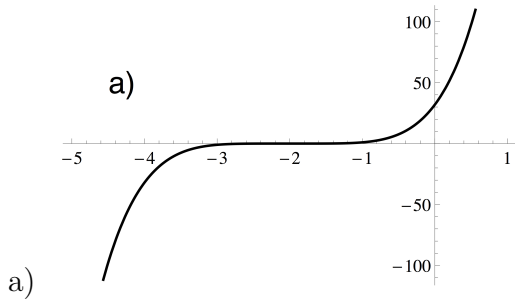
- a) $-2x^2 - 4x - 3$
- b) $2x^2 - 4x - 1$
- c) $x^2 + 2x$
- d) $-x^2 - 2x - 2$
- e) $-x^2 + 2x - 2$

7. Write the quadratic function $f(x) = 2x^2 - 8x + 10$ in standard form $f(x) = a(x - h)^2 + k$.

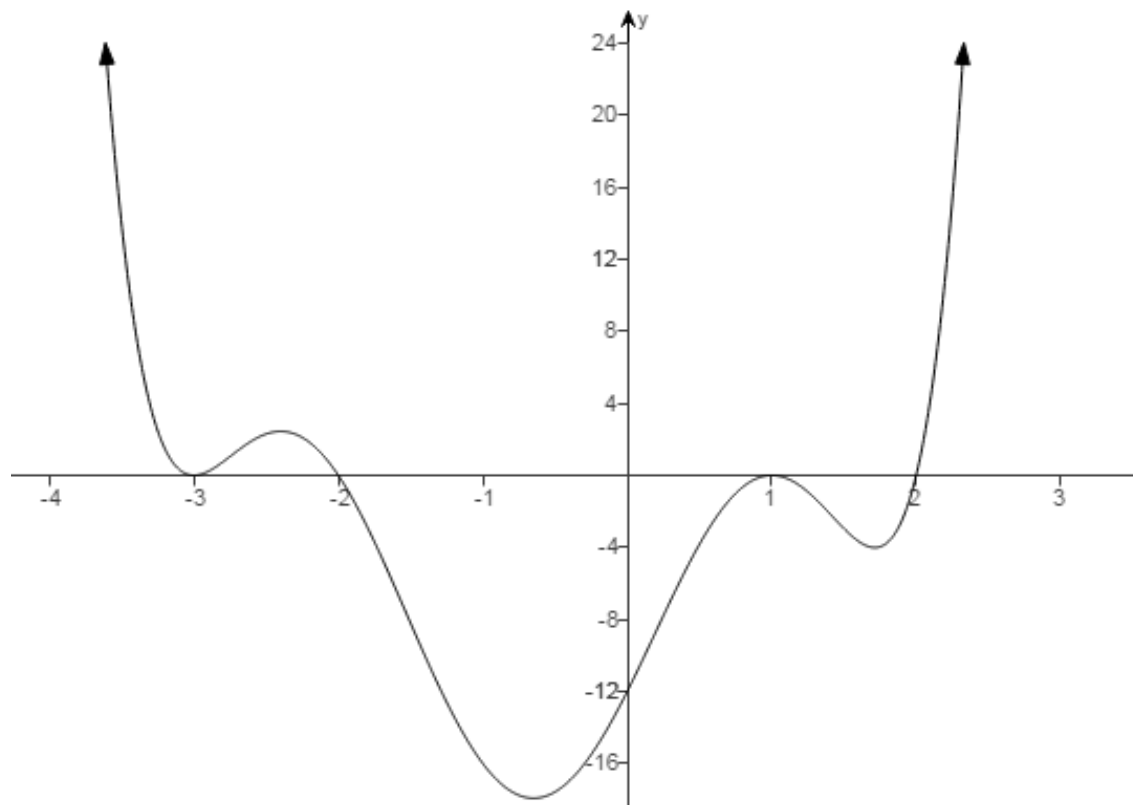
- a) $f(x) = 2(x - 2)^2 - 14$
- b) $f(x) = (x - 2)^2 + 6$
- c) $f(x) = 2(x + 2)^2 + 2$
- d) $f(x) = 2(x + 2)^2 + 34$
- e) $f(x) = 2(x - 2)^2 + 2$

8. What are the intercepts of the graph of $f(x) = (x + 1)^2 - 2$?
- a) x -intercepts: $x = -1 \pm \sqrt{2}$; y -intercept: $y = -2$
 - b) x -intercepts: $x = -1 \pm \sqrt{2}$; y -intercept: $y = -1$
 - c) x -intercepts: $x = 1 \pm \sqrt{2}$; y -intercept: $y = -1$
 - d) x -intercepts: $x = 1 \pm \sqrt{2}$; y -intercept: $y = -2$
 - e) x -intercepts: $x = -3, x = 1$; y -intercept: $y = 1$.
9. The owner of a coffee shop has determined that the hourly profits P of the store are given by $P(x) = -x^2 + 20x + 56$, where x is the number of customers per hour. Find the maximum hourly profit.
- a) \$156
 - b) \$100
 - c) \$128
 - d) \$256
 - e) \$200
10. You have 60 feet of fencing to enclose a rectangular plot that borders a river. If you do not fence the side along the river, find the dimensions of the plot that will maximize the area.
- a) 15 feet by 15 feet
 - b) 30 feet by 30 feet
 - c) 45 feet by 15 feet
 - d) 30 feet by 15 feet
 - e) 10 feet by 50 feet

11. Identify the graph of $f(x) = -(x + 2)^5$.



12. Which polynomial function has the graph given below?



- a) $-3(x + 3)^2(x + 2)(x - 1)^2(x - 2)$
 b) $-\frac{1}{2}(x + 3)^2(x + 2)^3(x - 1)^2(x - 2)$
 c) $\frac{1}{3}(x + 3)^2(x + 2)(x - 1)^2(x - 2)$
 d) $2(x + 3)^2(x + 2)(x - 1)^2(x - 2)$
 e) $\frac{1}{6}(x + 3)(x + 2)^2(x - 1)(x - 2)^2$

13. Which of the following is true of the graph of $f(x) = -2(x + 1)^2(x^2 - 1)$?
- a) It has the same end behavior as $y = x^2$.
 - b) It has the same end behavior as $y = -x^3$.
 - c) It has a y -intercept at $y = 0$.
 - d) It touches the x -axis at $x = -1$.
 - e) It crosses the x -axis at $x = 1$.
14. The function $f(x) = x^3 + 9x^2 + 26x + 24$ has a zero at $c = -4$. Use synthetic division to find the remaining zeroes.
- a) $x = 2, x = 3$
 - b) $x = -3, x = -2$
 - c) $x = -3, x = 2$
 - d) $x = -2, x = 3$
 - e) There are no other zeroes.
15. What is the remainder when $5x^6 - 3x^3 + 8$ is divided by $x + 1$?
- a) 6
 - b) 8
 - c) 16
 - d) 10
 - e) 0

16. Use the Factor Theorem to determine which of the following is a factor of $2x^3 - 3x^2 - 8x - 3$.

- a) $(x - 1)$
- b) $(x - 3)$
- c) $(x + 2)$
- d) x
- e) $(x - 4)$

17. Give the domain and intercepts of $f(x) = \frac{x^2 + x - 12}{x^2 + x}$.

- a) Domain: $(-\infty, -1) \cup (-1, 0) \cup (0, \infty)$; No y -intercept; x -intercepts: $x = -3, x = 4$.
- b) Domain: $(-\infty, -4) \cup (-4, 3) \cup (3, \infty)$; y -intercept: $y = 0$; x -intercepts: $x = -1, x = 0$.
- c) Domain: $(-\infty, -3) \cup (-3, 4) \cup (4, \infty)$; y -intercept: $y = 0$; x -intercepts: $x = -1, x = 0$.
- d) Domain: $(-\infty, -1) \cup (-1, 0) \cup (0, \infty)$; No y -intercept; x -intercepts: $x = -4, x = 3$.
- e) Domain: $(-\infty, 0) \cup (0, \infty)$; No y -intercept; x -intercepts: $x = -4, x = -1, x = 3$.

18. What are the asymptotes of $f(x) = \frac{2x^2 + x - 1}{x^3 - 9x}$?

- a) Vertical: $x = -3, x = 0, x = 3$; Horizontal: $y = 0$.
- b) Vertical: $x = -3, x = 0, x = 3$; No horizontal.
- c) Vertical: $x = -3, x = 0, x = 3$; Horizontal: $y = 2$.
- d) Vertical: $x = -3, x = 3$; Horizontal: $y = 0$.
- e) Vertical: $x = 0, x = 9$; Horizontal: $y = 0$.

19. Which of the following graphs does NOT have a vertical asymptote?

a) $y = \frac{x^2 - 1}{x - 1}$

b) $y = \frac{x^2 + 1}{x - 1}$

c) $y = \frac{1}{x^2 - 2x + 1}$

d) $y = \frac{x + 2}{x^2 + 2x}$

e) $y = \frac{x^2}{x^2 - 1}$

20. Determine which of the following statements is FALSE about the function $f(x) = \frac{x^2 - 2x - 3}{x^2 + 4x + 3}$.

a) The vertical asymptotes are $x = -1$ and $x = -3$.

b) The horizontal asymptote is $y = 1$.

c) There is a removable discontinuity at $(-1, -2)$.

d) The domain is $(-\infty, -3) \cup (-3, -1) \cup (-1, \infty)$.

e) The y -intercept is $y = -1$.

EXAM II- VERSION A

1. E
2. C
3. B
4. B
5. E
6. D
7. E
8. B
9. A
10. D
11. C
12. C
13. E
14. B
15. C
16. B
17. D
18. A
19. A
20. A