

## MAT 170 Test 1 Review Answers

Please let me know if you find any incorrect answers.

**A. Difference Quotients:** 1.  $-\frac{1}{3x(x+h)}$     2.  $-2x-h-3$     3.  $6x-5+3h$     4.

$$3x^2 + 7 + 3xh + h^2$$

**B. Inverse Functions:** 1.  $f^{-1}(x) = \frac{x+3}{1-x}$                       2.  $f^{-1}(x) = \frac{7-x}{3}$

3.  $f^{-1}(x) = \sqrt[3]{x+1}$                       4.  $f^{-1}(x) = \frac{3x}{2x-1}$

5. Domain of  $f(x) \equiv$  Range of  $f^{-1}(x)$  is  $(-\infty, -1) \cup (-1, \infty)$ .

Range of  $f(x) \equiv$  Domain of  $f^{-1}(x)$  is  $(-\infty, 1) \cup (1, \infty)$ .

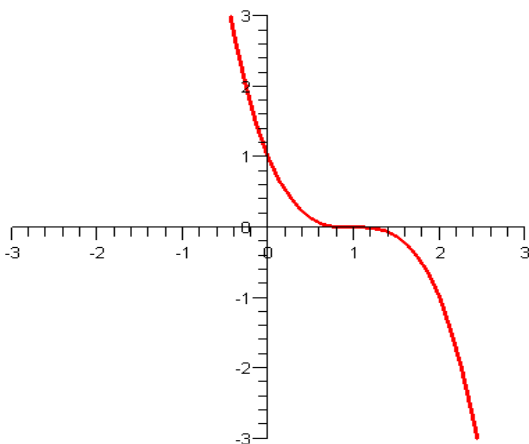
**C. Complex Number:** 1.  $\frac{66}{25} - \frac{12}{25}i$     2.  $\frac{4}{5} - \frac{18}{5}i$     3.  $\frac{-2}{15} - \frac{7}{5}i$

**D. Quadratic Functions:** 1.  $f(x) = 3(x-2)^2 - 11$                       2.  $f(x) = -2(x+4)^2 - 8$

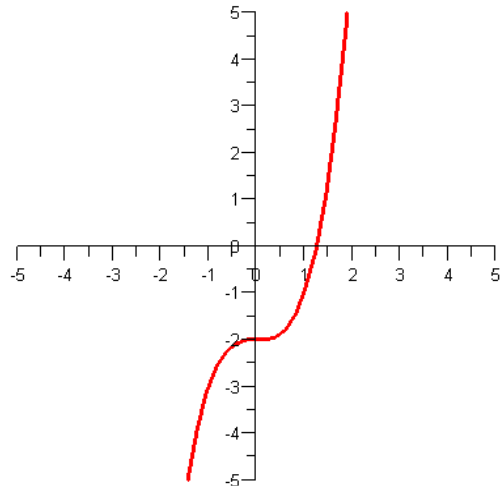
3.  $f(x) = -3(x-2)^2 + 12$

**E. Transformation of Functions:** 1.  $g(x) = (x-13)^3 - 23$ ,  $g(x) = -(x+6)^3 + 5$

2. graph of  $g(x)$   
reflection across x-axis, right shift 1 unit



graph of  $h(x)$   
downward shift of 2 units



3. a.  $g(x) = -(x-4)^2 + 8$

b.  $g(x) = (x+2)^2 + 6$

**F. Combinations, Compositions:** 1. a)  $\sqrt{x-3} - \frac{1}{x}$  b)  $\frac{1}{\sqrt{x-3}}$  c)  $\sqrt{\frac{1}{x}-3}$  d)  $x$

2. a)  $\frac{x}{x+2} - 3x + 2$  b)  $\frac{3x}{x+2} - 2$  c)  $\frac{3x-2}{3x}$  d)  $9x-8$

3. a)  $3x^2 - 2x + 1$  b)  $9x^2 + 3x - 5$  c)  $27x^2 - 33x + 9$  d)  $9x - 8$

**G. Decomposing Functions:** 1.  $f(x) = x^6$ ,  $g(x) = 3x^2 - 7x + 1$   
2.  $f(x) = \sqrt[3]{x}$ ,  $g(x) = 5x - 23$

**H. Increasing, Decreasing:** 1. inc.  $(-\infty, -2) \cup (2, \infty)$  dec.  $(-2, 2)$  2. inc.  $(-\infty, 3)$  dec.  $(3, \infty)$   
3. inc.  $(-2.87, 0.438) \cup (3.18, \infty)$  dec.  $(-\infty, -2.87) \cup (0.438, 3.18)$

**I. Piecewise Functions:** 1. 0 2. 1 3. -6

**J. Domains:** 1.  $(-\infty, -3) \cup (-3, 1) \cup (1, \infty)$  2.  $(-\infty, -2) \cup (-2, 2) \cup (2, \infty)$   
3.  $\left[\frac{-5}{13}, \infty\right)$  4.  $\left[\frac{-7}{6}, \infty\right)$  5.  $(-\infty, \infty)$

**K. Applications (quadratic):** 1. 3 seconds, 485 ft. 2. 10 planes, \$1,700,000

**L. Finding Values:** 1.  $x = 0, 3$  2.  $x = -2, 0, 2$

**M. Even/Odd functions:** 1. odd 2. neither 3. even

**N. function behavior:** 1. domain :  $[-4, \infty)$  2. range :  $[-4, \infty)$  3. x-intercept :  $(12, 0)$  4. y-intercept:  $(0, -2)$