

MAT 170 Test 1 Review Answers

There is a reasonable assumption that most of these answers are correct. If you find any incorrect answers, please contact your instructor as soon as possible.

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

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

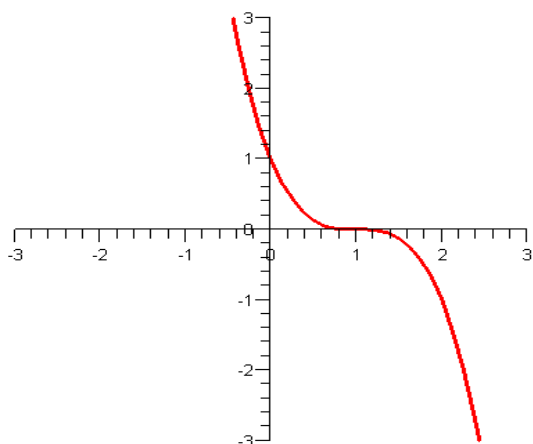
B. Inverse Functions: 1. $f^{-1}(x) = \frac{x+3}{1-x}$ 2. $f^{-1}(x) = \frac{7-x}{3}$
 3. $f^{-1}(x) = \sqrt[3]{x+1}$ 4. $f^{-1}(x) = \frac{3x}{2x-1}$
 5. Domain of $f(x) \equiv$ Range of $f^{-1}(x)$ is $(-\infty, -1) \cup (-1, \infty)$.
 Range of $f(x) \equiv$ Domain of $f^{-1}(x)$ is $(-\infty, 1) \cup (1, \infty)$.

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

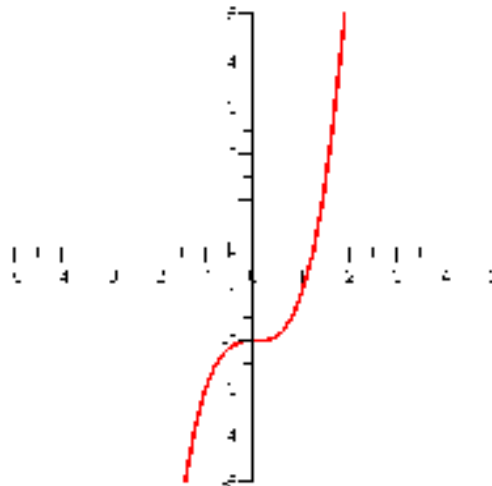
D. Quadratic Functions: 1. $f(x) = 3(x-2)^2 - 11$ 2. $f(x) = -2(x+4)^2 - 8$
 3. $f(x) = -3(x-2)^2 + 12$

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: $(0, -2)$