

Math 1513 - College Algebra

Exam #2 - 2018.10.31

Name: _____

1. [9 pts] Below is the graph of a function $f(x)$. Using the information on the graph, sketch on a separate graph the function $F(x) = -2f(x + 1) + 1$. Be sure to include important values on the your axes/graph, and also explain how you arrived at your graph.

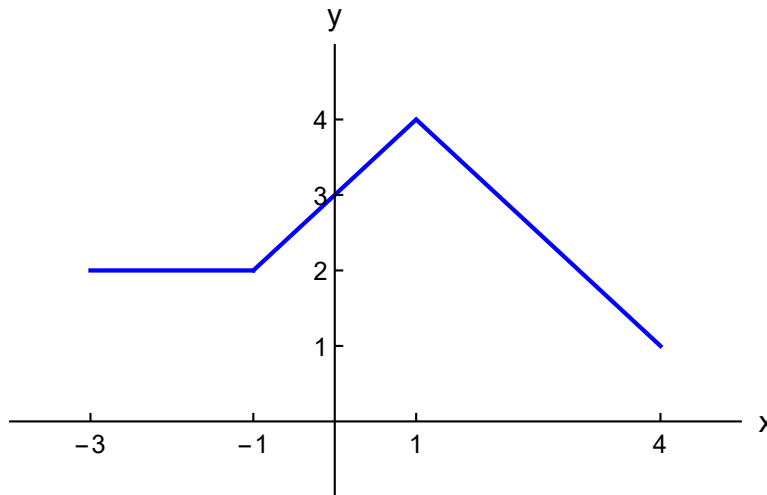


FIGURE 1. Graph of the function $f(x)$.

2. Use the following two piecewise defined functions to answer each part of this problem:

$$g(x) = \begin{cases} 2, & -3 < x \leq -2 \\ 3 + x, & -1 < x < 0 \\ 2, & x = 0 \\ \left| \frac{x}{2} - 1 \right|, & 1 \leq x \leq 4 \end{cases}, \quad h(x) = \begin{cases} x^2, & x < 0 \\ 3, & x = 0 \\ -x^2, & x > 0 \end{cases}$$

(a) [10 pts] Sketch the graph of $g(x)$.

(b) [2 pts] $g(0) =$

(c) [2 pts] $g(-3) =$

(d) [2 pts] $h(0) =$

(e) [2 pts] $g(-2.435389) =$

(f) [2 pts] $(g \circ h)(\sqrt{2}) =$

(g) [2 pts] $(h \circ g)(-2.5) =$

3. For this problem, consider the two functions $k(x) = \sqrt{2x + 3}$ and $m(x) = \frac{x + 1}{x - 1}$.

(a) [3 pts] State the domain of $k(x)$.

(b) [3 pts] State the domain of $m(x)$.

(c) [4 pts] Compute the domain of $k(x) + m(x)$.

(d) [4 pts] Compute the domain of $k(x) \cdot m(x)$.

(e) [5 pts] Compute the domain of $\frac{m(x)}{k(x)}$.

4. [6 pts] Divide the polynomial $p(x) = x^5 + 2x^4 - 12x^3 + 15x^2 - 7x + 2$ by $q(x) = x^2 - 2x + 1$. State if the division has a remainder.

5. For this problem, let $p(x) = 6x^5 - 23x^4 + 3x^3 + 41x^2 - 9x - 18$.

(a) [4 pts] Find all the *potential* rational roots of $p(x)$ using the rational roots test.

(b) [10 pts] Using your answer from part (a), fully factor $p(x)$.

6. [10 pts] Sketch the graph of $p(x) = -(x + 1)(x - 2)x^2(2x - 1)$.

7. [10 pts] Sketch the graph of the rational function $r(x) = -\frac{1}{5} \frac{(x-2)^2(x+2)}{(x-1)(x+3)}$.

8. [10 pts] Solve the inequality $R(x) = \frac{(x+2)^2(x-5)(2x-3)}{(x+1)^2(x-1)} < 0$, express your answer in interval notation.