

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. (a) Let $f(x) = x^2 - 7x$.

(i) Evaluate $f(3)$.

(ii) Solve $f(x) = -10$.

(b) Consider the function $f(x)$ specified by the following table:

x	-3	-2	-1	0	1	2
$f(x)$	7	5	-4	3	5	9

(i) Find $f(-1)$.

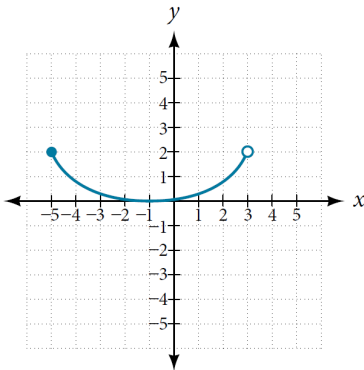
(ii) Solve $f(x) = 5$.

(iii) Is f one-to-one? Explain in a short, but precise, sentence why or why not.

2. (a) Let $f(x) = \frac{3x + 1}{4x + 7}$. Find the domain $\text{Dom}(f)$ showing all your steps.

(b) Let $f(x) = \sqrt{3 - 15x}$. Find the domain $\text{Dom}(f)$ showing all your steps.

(c) Let $f(x)$ be the function specified by the graph shown below.

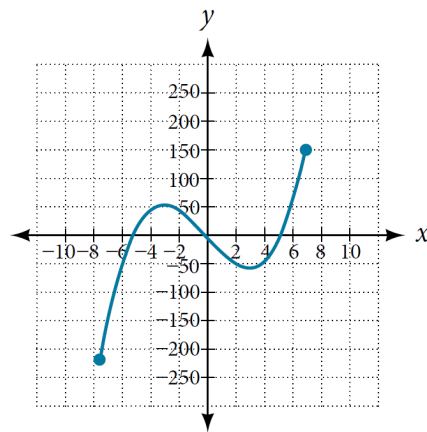


(i) Find the domain $\text{Dom}(f)$ and write it in interval notation.

(ii) Find the range $\text{Ran}(f)$ and write it in interval notation.

3. (a) Find the average rate of change of $f(x) = 2x^2 + 5$ over the interval $[1, 1 + h]$. Show all your work and simplify.

- (b) Let $f(x)$ be the function specified by the graph shown below.



- (i) Find the intervals where f is increasing.
- (ii) Find the local max point(s).
- (iii) Find the local min point(s).
- (iv) Find the absolute max and absolute min points.

4. (a) Let $f(x) = \frac{1}{x-4}$ and $g(x) = \frac{1}{7-x}$.

(i) Find a formula for $(f \circ g)(x)$. Show all steps and simplify.

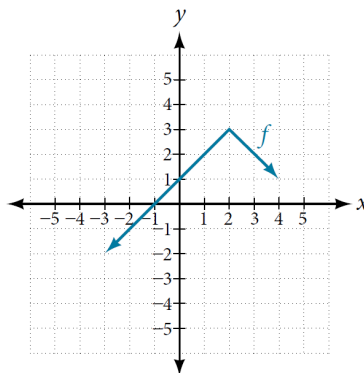
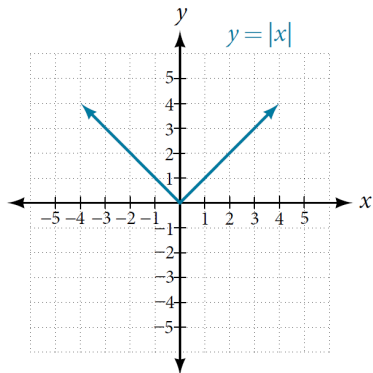
(ii) Find the domain $\text{Dom}(f)$.

(iii) Find the domain $\text{Dom}(g)$.

(iv) Find the domain $\text{Dom}(f \circ g)$. Show the two conditions and discover the restriction they impose on x , showing all your steps.

(b) Let $h(x) = \sqrt[3]{x^2 + 1}$. Find functions $f(x)$ and $g(x)$, so that $h(x) = (f \circ g)(x)$.

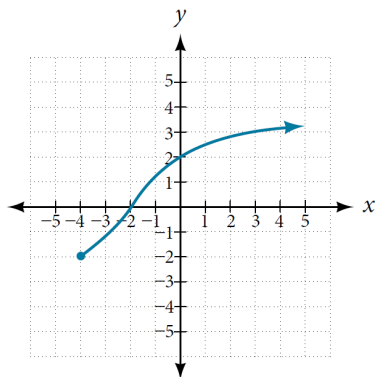
5. (a) The graph of $y = |x|$ is shown on the left. Show the formula transformations and give the corresponding verbal descriptions in the adjacent parentheses that are needed to get from $y = |x|$ to the graph of $y = f(x)$ shown on the right.



- $|x| \longrightarrow$ ()
 \longrightarrow ()
 \longrightarrow ()

- (b) Let $f(x) = \frac{5}{x-3} + 7$. Find a formula for $f^{-1}(x)$.

- (c) Let $f(x)$ be the function specified by the graph shown below. Find the following:



- (i) $f(3) =$ (iii) $\text{Dom}(f^{-1}) =$
(ii) $f^{-1}(0) =$ (iv) $\text{Ran}(f^{-1}) =$