

**Test #1**

**Directions:** Please show all work since partial credit is given. Answers without the necessary work will receive no credit. And remember to have fun!

1. Find the  $x$ - and  $y$ -intercepts of the following functions.

a)  $f(x) = |x + 1| - 3$  \_\_\_\_\_

b)  $h(x) = \frac{3x^2 - 18x + 21}{11 - 2x}$  \_\_\_\_\_

2. Let  $f(z) = z^2 - 9$  and  $g(z) = \sqrt{9 - z^2}$ .

a) Find and simplify  $(f \circ g)(z)$ . \_\_\_\_\_

b) State the domain of  $(f \circ g)(z)$  using interval notation. \_\_\_\_\_

3. Let  $f(x) = \sqrt{x-1}$ .

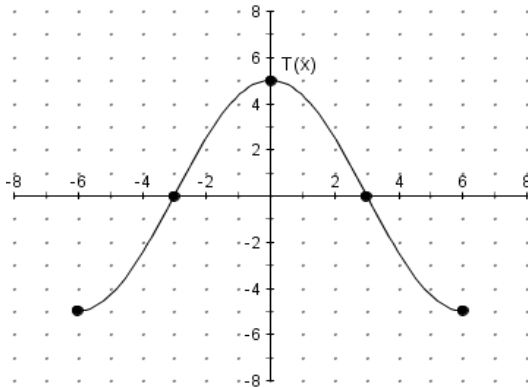
a) Find  $f^{-1}(x)$ . \_\_\_\_\_

b) State the domains and ranges of  $f(x)$  and  $f^{-1}(x)$ . Please use interval notation.

	$f(x)$	$f^{-1}(x)$
Domain		
Range		

c) Finally, find  $f(f^{-1}(x))$ . \_\_\_\_\_

4. Let  $T(x)$  be defined by the picture below, and let  $f(x) = -2T(x-3) + 1$  be a transformation of  $T(x)$ .



- a) Describe how the graph of  $f(x)$  is a transformation of  $T(x)$ . Specifically, state the transformations.

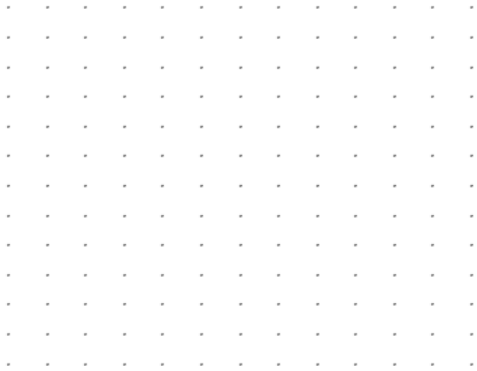
1.	
2.	
3.	
4.	

- b) Sketch a graph of  $f(x)$ , labeling the same corresponding five points of the graph of  $T(x)$ .



5. A less popular super hero, Super Frog, takes off from the ground. His trajectory is given by the equation  $h(t) = 28t - 4t^2$ , where  $h$  is in feet and  $t$  is in seconds.

a) Sketch a graph of Super Frog's *path*. Make sure to label all intercepts and the vertex. You must find these values *algebraically* to receive any credit for the entire problem!



b) State the domain and range of  $h(t)$ , taking into account that this is an application.

Domain: \_\_\_\_\_

Range: \_\_\_\_\_

c) At what time does Super Frog land on the ground? \_\_\_\_\_

d) At what time does Super Frog reach a maximum height? \_\_\_\_\_

e) What is his maximum height? \_\_\_\_\_

f) Find the time(s) when Super Frog is 35 feet off the ground?

\_\_\_\_\_

6. Let  $P(z) = -4z^3 + 4z^2 + 20z$ .

a) State the domain and range of  $P(z)$ . Domain: \_\_\_\_\_

Range: \_\_\_\_\_

b) Find the zeros of the polynomial. \_\_\_\_\_

c) Describe the end behavior (Global behavior) of  $P(z)$ . Make sure to use the appropriate notation.

d) Sketch a graph of  $P(z)$ .



7. Let  $P(x) = 2x^3 + 4x^2 - 13x + 12$ , and suppose  $P(-4) = 0$ .

a) Factor  $P(x)$  completely. \_\_\_\_\_

b) Find all solutions of the equation  $P(x) = 0$ . \_\_\_\_\_

8. Simplify each of the following, and write your final answer in  $a + bi$  form.

a)  $(6 - 2i)(2 + 3i)$

\_\_\_\_\_

b)  $-2i^3 + 4i^2 + 7i - 1$

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