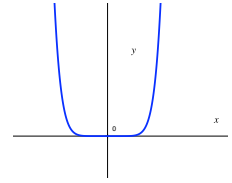


## Math 111 Worksheet #14 Solutions

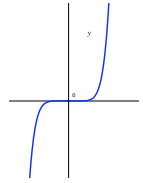
1. Match the following power functions with the possible graphs.

(a)  $y = 1.5x^8 \rightarrow iv$



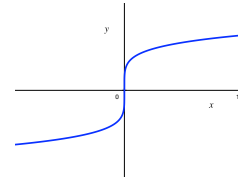
Since the power of  $x$  is even and positive, the graph will be U-shaped.

(b)  $y = 2x^7 \rightarrow vi$



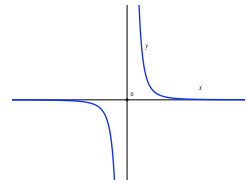
Since the power of  $x$  is odd and positive, the graph will be chair-shaped.

(c)  $y = 3x^{1/5} \rightarrow ii$



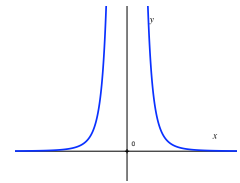
Since  $x^{1/5}$  is an odd root, the graph will have a shape like  $\rightarrow$

(d)  $y = \sqrt{2}x^{-9} \rightarrow i$



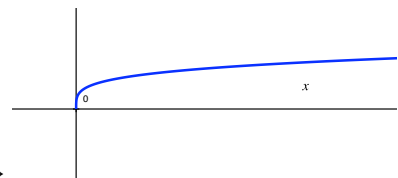
Since the power of  $x$  is odd and negative, the graph will be shaped like  $\uparrow$

(e)  $y = 4x^{-4} \rightarrow v$



Since the power of  $x$  is even and negative, the graph will be shaped like  $\uparrow$

(f)  $y = \frac{1}{2}x^{1/6} \rightarrow iii$



Since  $x^{1/6}$  is an even root, the graph will be shaped like  $\rightarrow$

2. Find a power function  $f(x) = kx^p$  that goes through the points  $(4, -6)$  and  $(9, -9)$ . (Hint: Find  $k$  and  $p$  by using the given points.)

Plugging in the values from the points:

$$-6 = k(4)^p \quad \text{and} \quad -9 = k(9)^p$$

Here is one way to solve for  $k$  and  $p$ :

Solving for  $k$  in the first equation:  $k = \frac{-6}{4^p}$

Plugging  $k = \frac{-6}{4^p}$  into the second equation:  $-9 = \frac{-6}{4^p} \cdot 9^p = -6 \cdot \frac{9^p}{4^p} = -6 \cdot \left(\frac{9}{4}\right)^p$

Dividing both sides by  $-6$   $\frac{-9}{-6} = \left(\frac{9}{4}\right)^p \Rightarrow \frac{3}{2} = \left(\frac{9}{4}\right)^p$

You can use logs to solve for  $p$  or note that  $3 = \sqrt{9}$  and  $2 = \sqrt{4}$ . So,  $p = \frac{1}{2}$ .

If  $p = \frac{1}{2}$ , then  $k = \frac{-6}{4^{1/2}} = -3$ .

So, the power function is  $f(x) = -3x^{1/2}$ .