

Math 29  
PAL Worksheet 6

1. Let  $f(x) = x^2 + 2x - 3$ ,  $g(x) = 3\sqrt{x}$ ,  $h(x) = \sqrt{x^2 + 4}$ ,  $j(x) = \frac{x-1}{x+1}$  and  $k(x) = (x + \sqrt[3]{x})^2$ . Identify each of the following functions as a composition of some of these functions.

a.  $l(x) = 3\sqrt{x^2 + 2x - 3}$

b.  $m(x) = (3\sqrt{x})^2 + 2(3\sqrt{x}) - 3$

c.  $n(x) = \frac{\sqrt{x^2 + 4} - 1}{\sqrt{x^2 + 4} + 1}$

d.  $p(x) = (x^2 + 2x - 3 + \sqrt[3]{x^2 + 2x - 3})^2$

e.  $q(x) = 3\sqrt[4]{x^2 + 4}$

f.  $r(x) = \sqrt{(x^2 + 2x - 3)^2 + 4}$

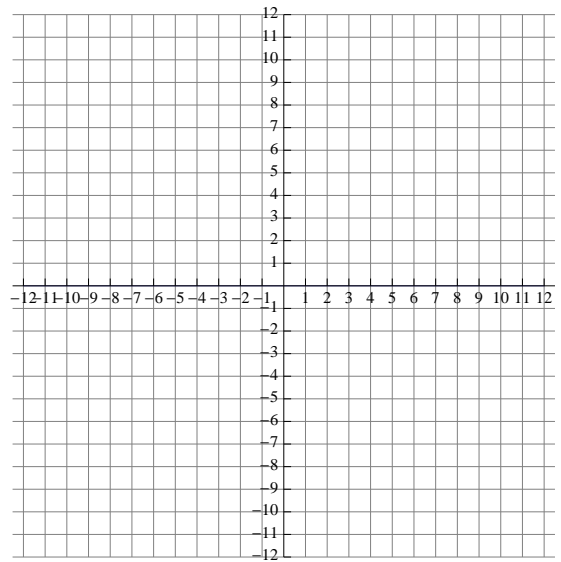
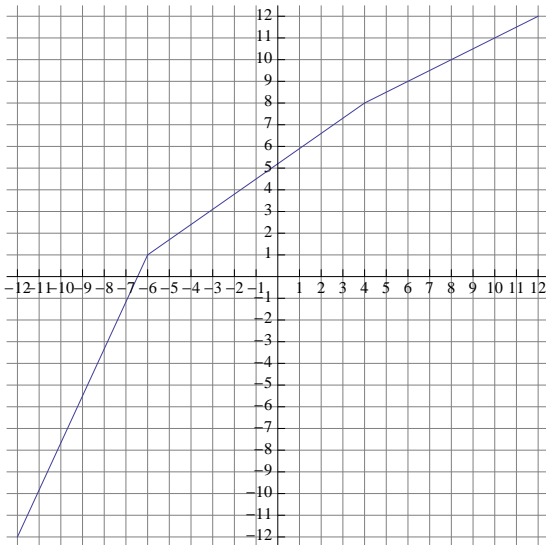
g.  $s(x) = 3\sqrt{\frac{x-1}{x+1}}$

h.  $t(x) = \frac{x^2 + 2x - 4}{x^2 + 2x - 2}$

2. The graph of an invertible function  $f$  is shown. Sketch the graph of of the inverse function  $f^{-1}$ .

$f$

$f^{-1}$



3. Verify that  $f$  and  $g$  are inverses by using composition. That is, show that  $(f \circ g)(x) = x$  and  $(g \circ f)(x) = x$ .

a.  $f(x) = 6x + 3$  and  $g(x) = \frac{x - 3}{6}$ .

b.  $f(x) = x^5 + 3$  and  $g(x) = \sqrt[5]{x - 3}$ .

c.  $f(x) = \sqrt[3]{x} + 2$  and  $g(x) = (x - 2)^3$ .

d.  $f(x) = \frac{2x + 1}{x - 1}, x \neq 1$  and  $g(x) = \frac{x + 1}{x - 2}, x \neq 2$ .

4. Each of the following functions has an inverse. Algebraically determine the rule for the inverse function. Express your answer using the proper notation for the inverse function.

a.  $f(x) = 7x^3 + 4$

b.  $g(x) = \sqrt[5]{4x - 3}$

c.  $h(x) = 4 + \sqrt[3]{5x - 3}$

d.  $u(x) = \frac{1}{2x - 9}$

e.  $v(x) = \frac{5x + 1}{3 - 2x}$

f.  $k(x) = 6 + \frac{x}{3x - 2}$