

2. (10 points)

Algebraically determine a “undoing” equation, $g(x)$, showing clear and complete work. Is this “undoing” equation a function? If it is a function, express it using proper function notation. If not, explain why not.

a. $f(x) = \frac{x-3}{x+4}$

b. $f(x) = \left(\frac{(x-3)^2}{5} + 1 \right)^3$

3. (10 points)

- a. Verify that $f(x) = \frac{x}{x+3}$ and $g(x) = \frac{-3x}{x-1}$ are inverse functions by examining $f(g(x))$ and $g(f(x))$.

4. (5 points)

Let f be an invertible function with the following values:

$$f(-3) = -2 \quad f(-2) = 0 \quad f(-1) = 1 \quad f(0) = 2 \quad f(1) = 3 \quad f(4) = 6$$

Find the values of the following:

a. $-f(-2)$

b. $f^{-1}(2)$

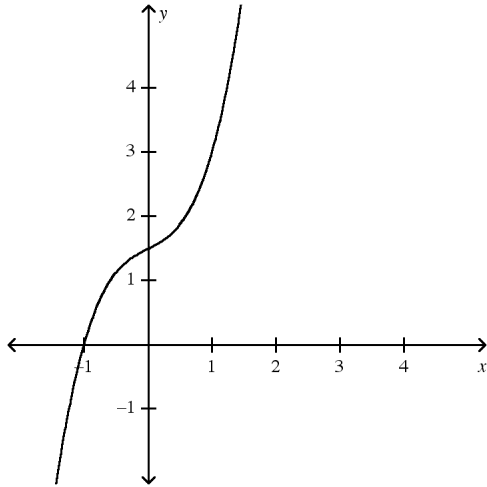
c. $\frac{1}{f(0)}$

d. $-f^{-1}(6)$

e. $\left(-f^{-1}(0)\right)^{-1}$

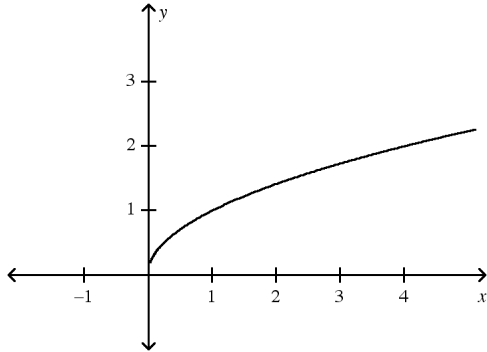
5. (8 points)

The graph of $f(x) = \frac{2x^3 + x + 3}{2}$ is shown below.

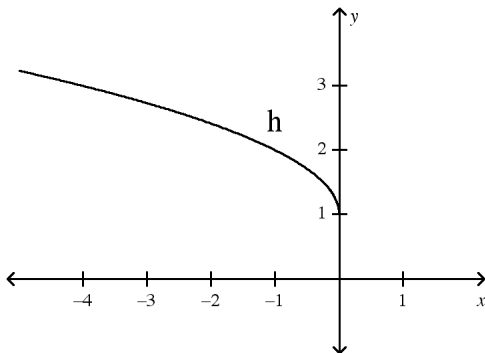
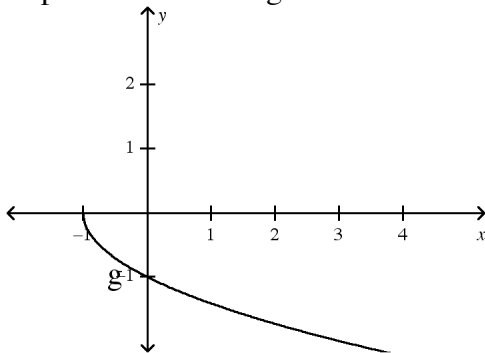


- On the same axes, sketch a graph of $y = f^{-1}(x)$.
 - Find $f^{-1}(0)$.
 - Find an approximate value of x for which $f(x) = f^{-1}(x)$.
 - Find an exact value of x for which $f^{-1}(x) = 2$.
6. (12 points)
- A function f is given with a sequence of transformations. The graph of a new function g is obtained from the graph of f by performing these transformations (in the order given). Write g in terms of f and use this to find the rule of g .
- $f(x) = 2x^2 + 1$; shift f 2 units to the left. Then move down by 4 units. Then reflect over the x -axis.
 - $f(x) = \sqrt{x+1} - 2$; Compress f by a factor of 2 horizontally, stretch vertically by a factor of 3, and then move down 4.
 - $f(x) = \sqrt{-x}$; Stretch f by a factor of 2 horizontally, reflect over the y -axis, shift down 4.

7. (12 points)

The graph of $f(x) = \sqrt{x}$ is shown below.

- a. Describe what you would do (in terms of shifts, compressions, stretches, and reflections) to the graph of $f(x) = \sqrt{x}$ to get the graph of $g(x) = 1 + \sqrt{2x}$.
- b. Describe what you would do (in terms of shifts, compressions, stretches, and reflections) to the graph of $f(x) = \sqrt{x}$ to get the graph of $h(x) = 4\sqrt{x-2} + 3$.
- c. Express the following functions in terms of f and then in terms of x .



8. (10 points)

A box has a square bottom and is 3 inches taller than it is wide.

a. If it has a surface area of 350 square inches, then what are the dimensions of the box?
Approximate to the nearest 0.1 unit.

b. Write an equation which can be used to find the length of the side of the base when the surface area of the box is known.

9. (10 points)

A patio is L-shaped, as shown below, and consists of three square sections of concrete. This patio is to be torn out and replaced with a patio in the shape of a square which will be three feet longer and three feet wider than the long sides of the existing patio (the one shown). This new patio will then be 649 square feet larger than the original. To the nearest 0.1 square foot, what is the area of the existing patio?

