Math 110 – Chapter 2 – Worksheet 3 – Version A

## Combining Functions; Inverse Functions

Section 2.8 Combining Functions

1. Let $f(x) = 3x - 1$, $g(x) = x^2 + 2$. Find $(f + g)(x)$, $(f - g)(x)$, $(fg)(x)$, and $\left(\frac{f}{g}\right)(x)$.

2. Let $f(x) = \sqrt{x - 1}$, $g(x) = \sqrt{3 - x}$. Find the domain of $(f + g)$, $(f - g)$, (fg), and $\left(\frac{f}{g}\right)$.

3. Let $f(x) = -5x$, $g(x) = x^2 + 1$. Find $(f \circ g)(0)$ and $(g \circ f)(0)$

4. Let $f(x) = 2 - x$, $g(x) = 2x^2 + 1$. Find $(f \circ g)(x)$ $(g \circ f)(x)$ and $(g \circ g)(x)$

5. Let $f(x) = \sqrt{x + 1}$ and $g(x) = \frac{2}{x-3}$. Find the domain of $(f \circ g)$

6. Let $f(x) = \sqrt{x - 1}$ and $g(x) = \sqrt{4 - x^2}$. Find the domain of $(f \circ g)$ and $(g \circ f)$.

7. The function $H(x) = \frac{1}{\sqrt{2x^2+1}}$ is decamped as a composition $(f \circ g)$. Find f if $g(x) = \sqrt{2x^2 + 1}$

8. Suppose oil spills from a tanker into the Pacific Ocean and the area of the spill is a perfect circle. The radius of this oil slick increases at the rate of 3 miles per hour. Express the area as a function of time. Calculate the area covered by the oil in six hours.

9. A car dealer offers an 6% discount of the manufacturer's suggested retail price (MSRP) of x dollars for any new car in his lot. At the same time the manufacturer offers a \$4500 rebate for each purchase of a new car.

    a) Write a function $r(x)$ that represents the price after only the rebate.
    b) Write a function $d(x)$ that represents after only the dealer's discount.
    c) Write the functions $(r \circ d)(x)$ and $(d \circ r)(x)$. What do they represent?
    d) Calculate $(d \circ r)(x) - (r \circ d)(x)$. Interpret the expression.

Section 2.9 Inverse Functions

10. Determine whether $f(x) = (x - 1)^2$ is one to one.

11. Assume that f is one to one. If $f(-3) = 12$, find $f^{-1}(12)$; If $f^{-1}(4) = 9$, find $f(9)$.

12. Verify, using the Inverse Function Property, that $f(x) = 3x - 1$ and $g(x) = \frac{x+1}{3}$ are inverses of each other.

13. Use the graph of the one to one function f given to sketch the graph of f^{-1}.
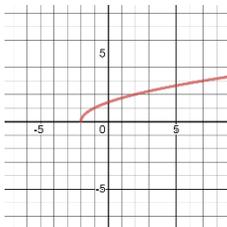
14. Find the inverse of the one to one function $f(x) = -2x + 3$.

15. Find the inverse of the one to one function $f(x) = \frac{x}{x+3}$, $x \neq -3$.

16. Find the domain and range of the function $f(x) = \frac{x}{x+3}$

17. Find the inverse of the one to one function $f(x) = x^2 - 1$, $x \leq 0$.