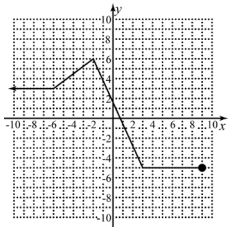
Math 110 – Chapter 2 – Worksheet 2 – Version A

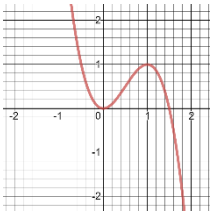
Properties of Functions; Transformation of Functions

Section 2.5 Properties of Functions

1. From the graph of the function f, find the intervals where f is increasing, is decreasing, or is a constant.



2. Use the graph of $g(x) = -2x^3 + 3x^2$ to estimate the relative minimum and the relative maximum points.



3. Show that the function $f(x) = -x^2 + 5$ is an even function.
4. Show that the function $f(x) = -x^3 + 5x$ is an odd function.
5. Determine whether each function is even, odd, or neither.
   a) $f(x) = 4x^5 - 7x^3 + 9x$
   b) $g(x) = -4x^4 - 72x^2 + 19$
   c) $h(x) = -3x + 1$
6. Find the average rate of change of $f(t) = 1 - t$ as t changes from $t = 2$ to $t = x$.
7. Evaluate the difference quotient for $f(x) = -x^2 + x - 3$ and simplify.
8. Write a linear function g for which $f(-2) = 2$ and $g(1) = 8$.
9. The largest known "Megatooth" specimen is a tooth that has a total height of 15.6 centimeters. Calculate the length of the "Megatooth" shark from which it came by using the formula, $\text{shark length} = (0.96)(\text{height of tooth}) - 0.22$ where shark length is measured in meters and tooth height is measured in centimeters. If the "Megatooth" specimen was a tooth measuring 16.4 centimeters, what was the length of the shark from which it came?

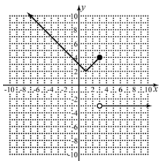
Section 2.6 Library of Functions

10. Graph $g(x) = \sqrt{-x}$ and find its domain and range.
11. Let $f(x) = \begin{cases} x^2 \text{ if } x \le -1 \\ 2x \text{ if } x > -1 \end{cases}$. Find $f(-2)$ and $f(3)$.
12. The local highway has a speed limit of 55 miles per hour (mph). If you are caught speeding between 56 mph and 74 mph, your fine is \$50 plus \$4 for every mile per hour over 55 mph. For 75 mph and higher, your fine is \$200 plus \$6 for each mile per hour over 75 mph.
    a) What is the piece-wise function that give your fine?

b) What is the fine for driving 60 mph?

c) What is the fine for driving 90 mph?

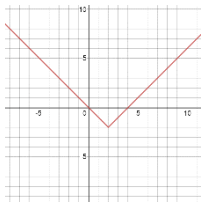
13. Let $F(x) = \begin{cases} -3x & \text{if } x \leq -1 \\ 2x & \text{if } x > 1 \end{cases}$. Sketch the graph of $y = f(x)$.
14. The graph of a piecewise function is given. Write the function algebraically. (one is an absolute value function)



15. Find the values of $f(x) = [\![x]\!]$ for $x = -3.4$ and $x = 4.7$

Section 2.7 Transformation of Functions

16. Sketch the graph of $f(x) = x^2$, $g(x) = x^2 + 2$, and $h(x) = x^2 - 1$ in the same coordinate place. Describe how the graph of g and h are related to the graph of f.
17. Sketch the graph of $f(x) = x^2$, $g(x) = (x+1)^2$, and $h(x) = (x-2)^2$ in the same coordinate place. Describe how the graph of g and h are related to the graph of f.
18. Use the transformations of the basic graph of $f(x) = \sqrt{x}$ to sketch the graphs of $g(x) = \sqrt{x-1} + 2$ and $h(x) = \sqrt{x+3} - 1$.
19. Explain how the graph of $g(x) = -(x+2)^2 - 4$ can be obtained from $f(x) = x^2$.
20. Use the graph of $f(x) = (x+1)^2 - 4$ to sketch the graph of $y = |f(x)|$
21. Use the graph of $g(x) = 2x - 4$ to sketch the graph of $y = |g(x)|$
22. Sketch the graph of $f(x) = \sqrt{x}$ and $g(x) = 2\sqrt{x}$ on the same coordinate plane and describe how the two graphs are related.
23. The graph of a function $y = f(x)$ is given. Sketch the graph of $y = f(2x)$ and $y = f\left(\frac{1}{2}x\right)$



24. Use the graph of $y = \sqrt{x}$ to sketch the graph of $f(x) = 3\sqrt{x+1} - 2$
25. Use the graph of $y = f(x)$ to graph $y = \frac{1}{2}f(x-1) + 3$