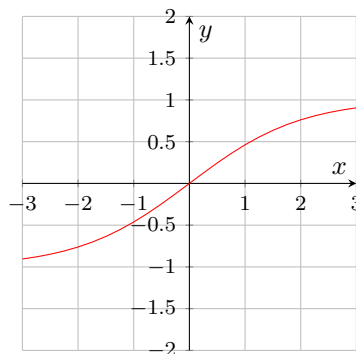
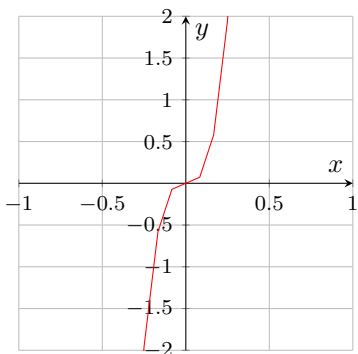
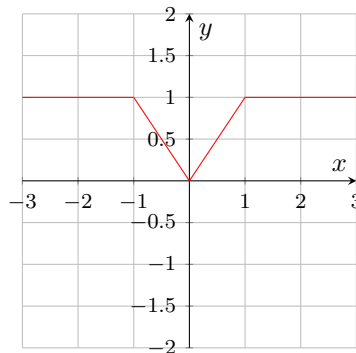
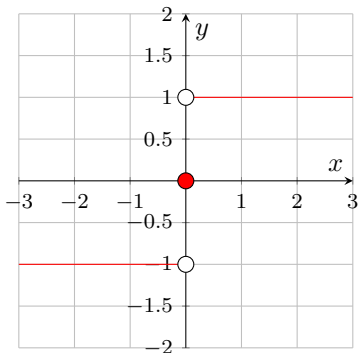


Algebra and Calculus Worksheet 5 (10-19-15)

Name: _____

1. Which of the following are one-to-one functions?



2. **True or false:** An even function can never be a one-to-one function.

3. Let b be the y-intercept of the function $f(x) = (x - 2)^3 + 1$. What is $f^{-1}(b)$?

4. Give me an example of:

- (a) A smooth, continuous function
- (b) A continuous function with a corner
- (c) A continuous function with a cusp
- (d) A discontinuous function

5. Consider the following general form of a polynomial: $P(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$.

- (a) What is the leading coefficient?
- (b) Identify the constant term.
- (c) If I wanted to find the end behavior of the polynomial, which term should I look at?
- (d) What is the value of the polynomial when $x=0$?
6. As the degree of a polynomial increases, the graph becomes _____ (*flatter, steeper*) around the origin and _____ (*flatter, steeper*) elsewhere.
7. (*Section 3.2: Q5*) Sketch a graph of the following via the *transformation of monomials* method (i.e. sketch the original monomial, and then transform it in the appropriate way):
- (a) $P(x) = x^3 - 8$
- (b) $Q(x) = -x^3 + 27$
- (c) $R(x) = -(x + 2)^3$
- (d) $S(x) = -\frac{1}{2}(x - 1)^3 + 4$
8. (*Section 3.2: Q11*) Describe the end behavior of $R(x) = -x^5 + 5x^3 - 4x$
9. (*Section 3.2: Q17*) Sketch a graph of $P(x) = -x(x - 3)(x + 2)$.
10. (*Section 3.3: Q9*) Divide $D(x)$ into $P(x)$ using both long and synthetic division, and express $P(x)$ as $P(x) = Q(x)D(x) + R(x)$.
- $P(x) = -x^3 - 2x + 6, D(x) = x + 1$
11. **True or false** If I tell you that $P(x)$ is a polynomial of degree n and $P(c) = 0$, then $S(x) = \frac{P(x)}{x - c}$ is a polynomial of degree $n-1$.
12. (*Section 3.3: Q27*) Find the quotient using synthetic division: $\frac{3x^2 + x}{x + 1}$.
13. (*Section 3.3: Q57*) Use the factor theorem to show that the given value of c is a zero of $P(x)$ and find all other zeros of $P(x)$: $P(x) = x^3 + 2x^2 - 9x - 18, c = -2$.