Review for Math 1410 Worksheet **Name:**_____

College Algebra

1. Draw a real number line and shade the following interval(s).
   (a) $[-2, \infty)$
   (b) $(-4, 1/2)$
   (c) $[-\pi/2, -1)$
   (d) $(-\infty, 732)$
   (e) $[0, 2\pi]$
   (f) $(-\infty, \infty)$

2. Simplify
   (a) $\left(\dfrac{4a^4}{b^5}\right)^2 \dfrac{b^3}{a^7}$
   (b) $\dfrac{1}{t+2} + \dfrac{t}{t-1} - \dfrac{3t}{t^2+t-2}$
   (c) $\dfrac{\frac{1}{y} + \frac{y}{y-1}}{\frac{2}{y-1} - \frac{1}{y}}$
   (d) $3(x+5)^{\frac{-1}{4}}(x-2)^2 + (x+5)^{\frac{3}{4}}(x-2)$

3. Solve the following inequalities in terms of intervals and draw the solution set on a real number line:
   (a) $1 - 7x \leq 3 + 4x$
   (b) $|-5x+3| \leq 4$
   (c) $x^3 - x^2 < 0$
   (d) $0 < |x-5| < 1/2$

4. Draw a single coordinate plane and plot the following points
   (a) $(3, 4)$
   (b) $(-\pi, 1)$
   (c) $(\pi, -1)$
   (d) $(-1/2, -1/4)$

5. State the formula for the distance between two points in the plane. Find the distance between the points $(2, 5)$ and $(4, -7)$.

6. Find the equation of the line through the following points.
   (a) $(0, 3)$ and $(2, 1)$
   (b) $(-1, -1)$ and $(1/2, 3)$

7. State any definition of a function $y = f(x)$. State the definition of the domain of $f(x)$.

8. State the Vertical Line Test (VLT).

9. State the definition of what it means for a function f to be increasing on an interval I. Repeat for decreasing.

10. Sketch the following graphs (at most 2 graphs in a coordinate plane, please):
    (a) $y = x$
    (b) $f(x) = x^2$
    (c) $g(x) = x^3$
    (d) $y = \dfrac{1}{x}$
    (e) $y = |x|$
    (f) $x^2 + y^2 = 4$
    (g) $y = -x/2 + 4$
    (h) $\{(x, y) \mid x^2 + y^2 \leq 3\}$
    (i) $y = (x+3)^2 - 1$

11. Let $f(x) = 3 - 4^x + x^2 - 5x + \dfrac{1}{3x} - \sqrt{x}$. Find the following, if possible:
    (a) $f(1)$
    (b) $f(0)$
    (c) $f(-1)$
    (d) $f(a)$
    (e) $f(a+h)$
    (f) $f(x+h)$

12. Let $f(x) = \sqrt{x}$. Let $g(x) = x - 19$. Find $(f \circ g)(x)$, then state its domain.

13. Let $f(x) = 1 - x^9$, $g(x) = \dfrac{1}{x}$, and $h(x) = \cos x$. Find the following compositions:
    (a) $(f \circ g)(x)$
    (b) $(h \circ f)(x)$
    (c) $(f \circ g \circ h)(x)$