Diagnostic Quiz Name:
Math 229, Calculus I

This is material from most algebra classes. You should know how to do all of these problems. Some may be more challenging, but they show up throughout the course.

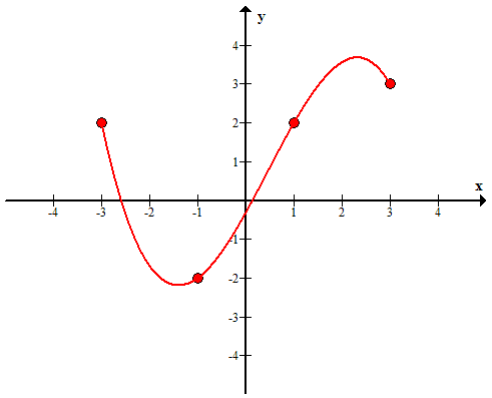
1. Expand and Simplify
   (a) $3(x+6)-4(2x-5)$
   (b) $(x+3)(2x-5)$
   (c) $(3x-4)^2$
2. Factor each expression
   (a) $4x^2-25$
   (b) $2x^2+5x-12$
   (c) $x^2-14x+48$
   (d) $5x^{1/3}(x-4)^4+\frac{1}{3}x^{-2/3}(x-4)^5$
3. Simplify
   (a) $\dfrac{x^2+3x+2}{x^2-x-2}$
   (b) $\dfrac{2x^2-x-1}{x^2-9}\cdot\dfrac{x+3}{2x+1}$
4. Rationalize the expression and simplify
   (a) $\dfrac{x-16}{\sqrt{x}-4}$
   (b) $\dfrac{\sqrt{4+h}-2}{h}$
5. Solve each equation
   (a) $2x^2+4x+1=0$
   (b) $0=1-\dfrac{1}{x^2}$
   (c) $x+5=14-\dfrac{1}{2}x$
6. Solve the inequality: $x^2-2x-8<0$
7. Find the slope between the following points
   (a) $(-2,4)$ and $(0,6)$
   (b) $\left(\frac{2}{3},3\right)$ and $\left(-\frac{1}{3},8\right)$
8. Find the equation of each line that passes through the point $(2,-5)$ and

(a) Has slope 3

(b) Is parallel to the line $y = 5x - 3$

(c) Is parallel to the x-axis.

9. The graph of a function f is given below. Answer the following questions



(a) State the value of $f(-1)$

(b) Estimate the value of $f(2)$

(c) For what values of x is $f(x) = 2$?

(d) Estimate the values of x such that $f(x) = 0$

(e) Estimate the intervals where $f(x)$ is increasing and decreasing

(f) State the domain and range of f.

10. If $f(x) = x^2 - 1$,

(a) Find $f(2 + h)$

(b) Evaluate the difference quotient $\dfrac{f(2+h) - f(2)}{h}$ and simplify your answer.

11. State the domain of the following functions

(a) $f(x) = \dfrac{2x + 1}{x^2 + x - 2}$

(b) $\sqrt{5 - 3x}$

(c) $\dfrac{2x}{\sqrt{\dfrac{1}{x} - 1}}$

12. Graph the following functions

(a) $f(x) = 1 - x^2$

(b) $f(x) = 2x + 1$

13. Graph the following piecewise function.

(a) $f(x) = \begin{cases} 1 - x^2, & x \leq 0 \\ 2x + 1, & x > 0 \end{cases}$

(b) Find $f(-2)$, $f(0)$, and $f(1)$

14. Graph $f(x) = \begin{cases} x^2 - 1, & x < 1 \\ 3, & x = 1 \\ \sqrt{x-1}, & x > 1 \end{cases}$

    Does it appear $f(x)$ is continuous?

15. If $f(x) = x^2 + 2x - 1$ and $g(x) = 2x - 3$, find each of the following

    (a) $f \circ g$

    (b) $g \circ f$

    (c) Evaluate $(f \circ g)(4)$

16. Let $f(x) = \dfrac{1}{x-1}$ and $g(x) = \sqrt{x}$. Find the domain of $f \circ g$ and $g \circ f$.