

MTH 251
LAB DAY ONE

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Most all of the skills you learned in algebra and precalculus courses will be necessary for your success in calculus. This document is meant to allow you to self-diagnose any gaps in knowledge you may have. Take some time to work through all of these exercises, and note any time you feel unsure or hesitant about *any* spot or step you take. This are times you will want to ask for assistance.

1. Simplify $\left(\frac{-2xy^{-3}}{5x^{-2}y^2}\right)^3$.
2. Write $\sqrt[4]{81x^3}$ as an algebraic expression with no radicals. Simplify where possible.
3. Explain in as much detail as possible why $(2x - 3)^2$ is not $4x^2 - 9$.
4. Factor $128z - 2z^7$ completely.
5. Find an equation for the line on the points $(-2, 7)$ and $(6, 1)$. Express the equation in both point-slope and slope-intercept form.
6. Simplify $\frac{\frac{1}{x} - \frac{x}{3+x}}{\frac{x}{3+x} + \frac{3}{x^2}}$.
7. Rationalize the denominator of $\frac{x - 1}{\sqrt{1 - x^2} - 1}$.
8. Your success in calculus will rely heavily on your knowledge of graphs. For each of the functions below, draw a set of coordinate axes. Label your axes with an x and a y on the positive sides of the axes. Draw tic marks and provide a scale.
 - a. $f(x) = (x - 2)^2 + 3$.
 - b. $g(x) = \ln(x + 1)$.
 - c. $h(x) = e^x + 1$.
 - d. $j(x) = \sqrt{4 - x}$.
 - e. $k(x) = |x + 3|$.
 - f. $\ell(x) = \frac{1}{x+1} + 1$.
 - g. $m(x) = \sin(2x)$.
 - h. $n(x) = \tan\left(\frac{x}{2}\right)$.
9. Evaluate each of the following trigonometric functions exactly, without the aid of a calculator.
 - a. $\sin 210^\circ$.
 - b. $\cos \frac{5\pi}{4}$.
 - c. $\tan \frac{11\pi}{3}$.
 - d. $\arcsin \frac{\sqrt{3}}{2}$.
 - e. $\cos^{-1} \frac{\pi}{2}$.
 - f. $\tan^{-1} \sqrt{3}$.
10. Let $f(x) = \sqrt{1 - x^2}$.
 - a. What is the domain of f ?
 - b. Make a table of values for f with at least eight different inputs.

- c. Draw a set of coordinate axes and sketch a graph of $y = f(x)$ using the table of values you created.
- d. What sort of a shape is created by this graph?
- e. Use www.desmos.com to graph $y = f(x)$. Does it match your graph?