

Calculus I, 21-111
Review problems for the first test
February 13

1. Solve the equation $x^3 - 6x^2 + 4x = 0$.
2. Simplify so that your does not involve parentheses or negative exponents:

$$\frac{(8x^2y)^{\frac{2}{3}}}{(xy^{-2})^{-1}}$$

3. Consider the functions $f(x) = \frac{x}{2+x}$ and $g(x) = \frac{4}{x}$. Calculate and simplify each of the following:
 - (a) $f(g(x))$
 - (b) $f(x) + g(x)$
4. Find the derivative of the function $f(x) = x^2 + 5x$ directly from the definition.
5. Determine the equation of the tangent line to the graph of $f(x) = 2x^2 + 3x$ where $x = 1$ and express it in the form $y = mx + b$.
6. Determine the equation of the line parallel to the line $3x + 5y = 6$ and passing through $(-2, 4)$. Express it in the form $Ax + By = C$ and draw its graph.
7. The height in feet of a ball is given by $s(t) = -16t^2 + 48t + 64$ after t seconds. Answer each of the following:
 - (a) What is the ball's initial height?
 - (b) What is the ball's initial velocity?
 - (c) When will the ball hit the ground?
 - (d) How fast will the ball be travelling when it hits the ground?
 - (e) When will the ball be at its highest point?
 - (f) How high will the ball be at its highest point?
8. Sketch the graph of $y = x^3 + 6x^2$, and label any intercepts, local maximums or minimums, and points of inflection.
9. Determine the absolute maximum and absolute minimum of the function $f(x) = x^3 + 3x^2 + 5$ on the interval $-2 \leq x \leq 2$. Indicate briefly how you know that the points you indicate are the maximum and the minimum.