You may keep this page of questions. Turn in all of your work with your answers on the colored paper and the graph paper. Except where explicitly noted, calculators are not allowed.

1) 12 Points. Each of the following functions $\text{cmp}(x)$ is a composition $f(g(x))$ of simpler elementary functions $f(x)$ and $g(x)$. Find $f(x)$ and $g(x)$ for each composition.

   a) $\text{cmp}(x) = 3\sqrt[3]{7 + 4x}$
   b) $\text{cmp}(x) = (\tan x)^3 - 5 \tan x + 3$
   c) $\text{cmp}(x) = 2^\csc x$

2) 12 Points. Classify each of the following functions as odd, even, or neither.

   a) $f(x) = x^4 - 7x^2 + 3$
   b) $f(x) = \tan|x^3|$
   c) $f(x) = \ln(e^x + e^{-x})$

3) 24 Points.

   a) Sketch a graph of $y = f(x)$ if $f(x) = \begin{cases} -\sqrt{x-3} & \text{if } x \geq 3 \\ \text{undefined} & \text{otherwise.} \end{cases}$
   b) Find the domain and the range for $f$.
   c) Sketch a graph of $f^{-1}(x)$.
   d) Find a formula for $f^{-1}(x)$.

4) 12 Points. Suppose that $f'(x) \leq -2$ on $[-10, 10]$ and that $f(3) = 4$. What can you say about $f(5)$?

5) 12 Points. Suppose that $f$ is an even function and that $f$ is increasing on the interval $[a, b]$ where $0 < a < b$. Is $f$ increasing or decreasing on the interval $[-b, -a]$? Explain! The explanation is a significant part of your answer. Your explanation should make it clear that you know what an even function is and what an increasing function is.
6) 12 Points
The graph of the derivative of a function \( f \) is shown to the right.

a) On which intervals is \( f \) increasing? Decreasing?

b) On which intervals is \( f \) concave up? Concave down?

c) If \( f(5) = -1 \), find an equation for the straight line that is tangent to the curve \( y = f(x) \) at \((5,-1)\).

[NOTE: The graph of \( f \) is not shown.]

7) 16 Points. You will need to use your calculator for the final question. After you have finished with the questions above, you will turn in that work and receive graph paper and a different colored page for this last question. You are not allowed to use your calculator until after you have turned in work for the questions above.

a) On the graph paper, sketch a graph of \( y = f(x) = (x^3 - 4x)e^{-0.3x} \) using the window \( X_{\text{min}} = -5 \quad X_{\text{max}} = 30 \quad Y_{\text{min}} = -10 \) and \( Y_{\text{max}} = 50 \).

b) Use the box option under zoom to roughly center the point \((-1, f(-1))\) in a window where the curve is nearly linear. Record \( X_{\text{min}}, X_{\text{max}}, Y_{\text{min}} \) and \( Y_{\text{max}} \) for this window and sketch a graph showing how this nearly linear curve appears in this window.

c) Choose two points that are on the curve in this window. Record their coordinates and mark these points on your sketch for part b).

d) Use the two points from part c) to estimate \( f'(-1) \).