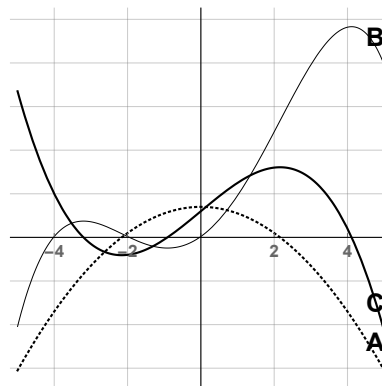
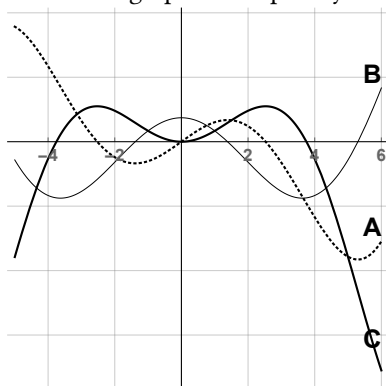


Some Sample Problems for Exam 2

These are only a *few* sample problems to *help* you prepare for the exam. You should also be certain that you completely understand the WeBWorK assignments, Problems Sets, Reading Assignments, in-class work, and your class notes.

1. The graphs of f , f' , and f'' are shown below on the same set of axes.

Label each on the graph and explain your answers.



2. Suppose that the graph labeled C on the left graph in #1 is the graph of $g'(x)$.

- Is g concave up or concave down at $x = -2$?
- Find all critical points of g and label them as local maxima, local minima, or neither.
- Suppose $g(-1) = 3$. Could $g(1) = 2$? Could $g(1) = 5$?

3. Suppose that the graph labeled B on the right graph in #1 is the graph of $h''(x)$.

- What are the inflection points of h ?
- If the critical points of h are $x = -3$, $x = -1$, and $x = 2$, use the Second Derivative Test to classify each as a local maxima or local minima, if possible.

4. Evaluate the following limits. Be sure to explain your answers.

$$(a) \lim_{x \rightarrow \infty} x^2 e^{-3x} \quad (b) \lim_{x \rightarrow \infty} \frac{\ln(x)}{\cos(3x) + 5} \quad (c) \lim_{x \rightarrow \infty} (1 + x)^{1/x}$$

5. Let $f(x) = 3x^5 - 25x^3 + 7$

- Find all critical points of f and classify them as local maxima, local minima, or neither.
- On which intervals is f increasing? Decreasing?
- Find the inflection points of f .
- On which intervals is f concave up? Concave down?

6. Verify that $F(x) = e^x x - e^x + 3$ is an antiderivative of $f(x) = xe^x$.

What important fact does the Mean Value Theorem tell us about any other antiderivative of f ?

7. You will, of course, want to be fluent in finding derivatives, and I would encourage you to pay special attention to the in-class work and assigned Problem Set exercises on optimization.