Calculus 1

Test 3

Form A

Spring 2016

Name: _____

Date: _____

READ THESE INSTRUCTIONS CAREFULLY!

- Circle or underline your final written answer.
- Justify your reasoning and show your work.
- If you run out of space, make a note and continue your work on the back of a page.

1. Find the interval(s) over which the following function is increasing or decreasing.

$$f(x) = x - 5\sqrt{x-2}$$

2. Find the interval(s) over which the following function is concave up or concave down.

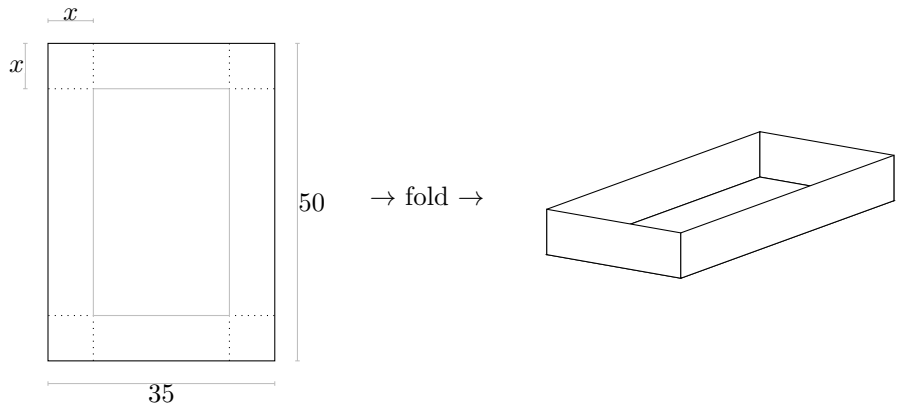
$$f(x) = x^3 - x$$

What are the inflection points of the graph of f?

3. Find the global extrema of $g(x) = (x+2)^2 + 4$ on $D = [-4, 1]$.

4. Use Newton's Method to find a rational approximation to $\sqrt{11}$ which is accurate to 8 decimal digits. (Since $3^2 < 11 < 4^2$, 3 is a reasonable initial guess.)

5. A rectangular sheet of aluminum, measuring 35 cm by 50 cm, is to have squares of side length x cut out of its corners. Then the sheet will be folded along the gray lines to form a rectangular tray as shown in the following diagram.



Find the value of x which maximizes the volume of the tray.

6. Compute the following antiderivative.

$$\int x^3 + \sin(x)\ \mathrm{d}x$$

7. Find the best degree 6 polynomial approximation of $f(x) = \sin(x) + \cos(2x)$ near $x = 0$. Plot both f and your approximating polynomial on the same set of axes using a graphing utility, and attach the printed plot to your exam.

8. Let

$$f(x) = x^4 - 10x^2 + 1.$$

Since f is a degree 4 polynomial, we know that it should have 4 roots (up to multiplicity). Use Newton's Method with a spreadsheet to approximate all four roots of f to 8 decimal digits. Attach a printout of your spreadsheet to this exam.

Bonus: Find the exact roots of the function f in problem 8.