Practice Examination 1 - Math 141, Frank Thorne (thornef@mailbox.sc.edu)

Wednesday, September 14, 2011

Please work without books, notes, calculators, or any assistance from others. If you have any questions, feel free to ask me.

Please do your work on separate paper; you should staple this sheet to your work (put this on top) and turn in everything together.

(1) Graph the function $y = \sqrt{x+3}$, not by plotting points, but by starting with the graph of $y = \sqrt{x}$ and applying the appropriate transformations. (Be sure to explicitly explain your work.)

(2) Define the term *inverse function*. Give an example of a function that has an inverse, and of a function that does not.

(3) Evaluate

$$\lim_{x \to 2} \frac{x^2 + x - 6}{x - 2},$$

if the limit exists.

(4) A parking lot charges three dollars for the first hour (or part of an hour) and two dollars for each succeeding hour (or part), up to a maximum of ten dollars.

(a) Sketch a graph of the cost of parking at this lot as a function of the time parked there. (b) Discuss the discontinuities of this function and their significance to someone who parks in the lot.

(5) Evaluate

$$\lim_{x \to -4} \frac{\sqrt{x^2 + 9} - 5}{x + 4},$$

if the limit exists.

(6) The cost of producing x ounces of gold from a new gold mine is $C = f(x)$ dollars.

(a) What is the meaning of the derivative $f'(x)$? What are its units?

(b) What does the statement $f'(800) = 17$ mean?

(c) Do you think the values of $f'(x)$ will increase or decrease in the short term? What about the long term? Explain.

(7) Evaluate

$$\lim_{x \to \infty} \left(\sqrt{9x^2 + x} - 3x \right).$$

(8) If $f(x) = 3 - 2x + 4x^2$, find $f'(a)$.