

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

**Wednesday, September 26, 2012**

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) Use the given graph of  $f$  to state the value of each quantity, if it exists. If it does not exist, explain why.

(a)  $\lim_{x \rightarrow 1^-} f(x)$ , (b)  $\lim_{x \rightarrow 1} f(x)$ , (c)  $\lim_{x \rightarrow 5} f(x)$ .

(2) Evaluate the limit  $\lim_{x \rightarrow 7} \frac{\sqrt{x+2}-3}{x-7}$ .

(3) Evaluate the limit  $\lim_{x \rightarrow -\infty} \frac{1-x-x^2}{2x^2-7}$ .

(4) If  $f(x) = 4 - x + x^2$ , find  $f'(x)$  using the definition of the derivative.

(5) If  $G(x) = \sqrt{x} - 2e^x$ , find  $G'(x)$ .

(6) If  $y = \frac{1}{s+ke^s}$ , where  $k$  is a constant, find  $\frac{dy}{ds}$ .

(7) Give the definition of the *derivative* of a function  $f(x)$  at the point  $x = a$ . (Please give the algebraic definition, using an equation.)

Draw a picture and explain why your equation gives the slope of the tangent line to the graph of  $f(x)$  at  $x = a$ .

(8) The figure shows the graph of a function  $f(x)$ . Sketch the graph of  $f'(x)$ .