

Exam 1 covers through Section 2.7 and the two Discussion Session sheets. Pay particular attention to the Suggested Exercises and to definitions. You should memorize the following definitions. You will need to know all of them on the exam. You will be asked to write the definition of the derivative. Memorize it.

1. For a function  $y = f(x)$ , the  $\lim_{x \rightarrow a} f(x) = L$ , means that for any  $\epsilon > 0$ , there is a  $\delta > 0$  such that, if  $|x - a| < \delta$ , then  $|f(x) - L| < \epsilon$ .
2. The function  $y = f(x)$  is continuous at the point  $a$  means that  $\lim_{x \rightarrow a} f(x) = f(a)$ .
3. The line  $y = L$  is a horizontal asymptote of the function  $y = f(x)$  means that  $\lim_{x \rightarrow \infty} f(x) = L$ , or  $\lim_{x \rightarrow -\infty} f(x) = L$ . The line  $x = a$  is a vertical asymptote of this function means that  $\lim_{x \rightarrow a} f(x) = \infty$ , or this limit is  $-\infty$ , or one of the one-sided limits at  $a$  is  $\infty$  or  $-\infty$ .
4. The derivative of the function  $y = f(x)$  at the point  $a$  is

$$\lim_{\Delta x \rightarrow 0} \frac{f(a + \Delta x) - f(a)}{\Delta x}$$

This limit, if it exists, is denoted  $f'(a)$ .

5. The tangent line to the graph of  $y = f(x)$  at  $(a, f(a))$  is defined to be the line through this point with slope  $f'(a)$ .
6. The instantaneous rate of change of  $y = f(x)$  with respect to  $x$  at  $x = a$  is defined to be the derivative  $f'(a)$ .