

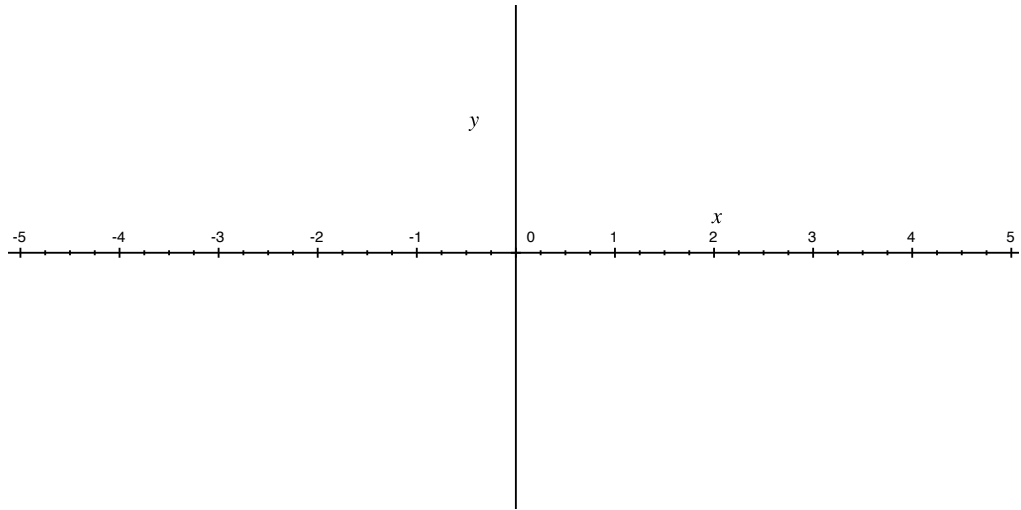
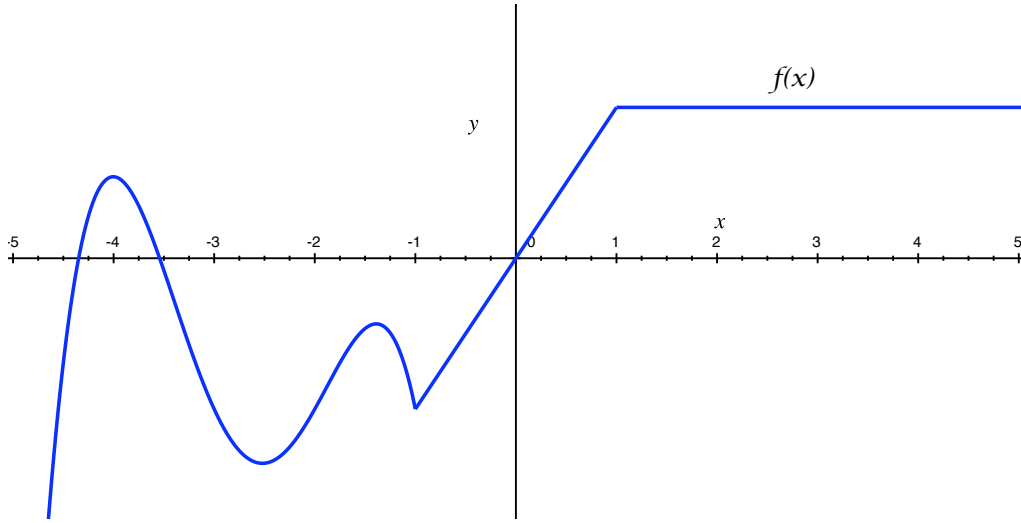
**Math 124**  
**Exam 1**  
**October 19th, 2007**

Name: \_\_\_\_\_

1. Your exam contains 5 questions and 6 pages; Please make sure you have a complete exam.
2. The entire exam is worth 100 points. Point values vary and these are indicated on each problem. You have 50 minutes for this exam.
3. Make sure to ALWAYS SHOW YOUR WORK; you will not receive any partial credit unless all work is clearly shown. If in doubt, ask for clarification. Note: To evaluate limits, proof by graph or table of values does not suffice for full credit.
4. If you need extra space, use an extra sheet attached to the back of the exam and clearly indicate this.
5. You are allowed one  $8.5 \times 11$  sheet of handwritten notes (both sides). Graphing and scientific calculators are allowed.
6. Leave answers in exact form (as simplified as possible) or round to 4 decimal places.

Problem	Total Points	Score
1	15	
2	27	
3	24	
4	18	
5	16	
Total	100	

1. (15 pts.) For the following function  $f$ , sketch a graph of the derivative  $f'$  on the axis given below.



2. (27 pts.)

(a) (6 pts.) Find the derivative of  $h(x) = \frac{4}{x^2} - 2x + 7$ .

(b) (14 pts.) Verify the derivative of  $h(x) = \frac{4}{x^2} - 2x + 7$  using the **limit definition** of the derivative.

(c) (7 pts.) Find the equation of the tangent line of  $h$  at  $x = 2$ .

3. (24 pts.) Evaluate the following limits. Justify your answers. If the limit is infinite, determine if it is  $+\infty$  or  $-\infty$ .

(a) (8 pts.)  $\lim_{x \rightarrow 4} \frac{x^2 - 16}{x^3 - 3x^2 - 4x}$

(b) (8 pts.)  $\lim_{t \rightarrow \pi^+} \frac{t+5}{\sin t}$

(c) (8 pts.)  $\lim_{x \rightarrow 3} [2x^2 e^{x-3} + \ln(\frac{2}{x-1})]$

4. (18 pts.)  $g(x) = \frac{2x+4}{x^2-x-6} - e^x + 4$ .

(a) (7 pts.) Find the following limit:  $\lim_{x \rightarrow \infty} g(x)$

(b) (11 pts.) Find the **equations** of the horizontal and vertical asymptotes of  $g(x)$ .

5. (16 pts.) A particle is moving away from a certain point along a straight line and the distance (in cm) is given by  $s = 3e^t - 8t$  at time  $t$  (in seconds).

(a) (8 pts.) At what time (if any) is the velocity equal to 13 cm/sec?

(b) (8 pts.) What is the acceleration at 2 seconds? Include units.