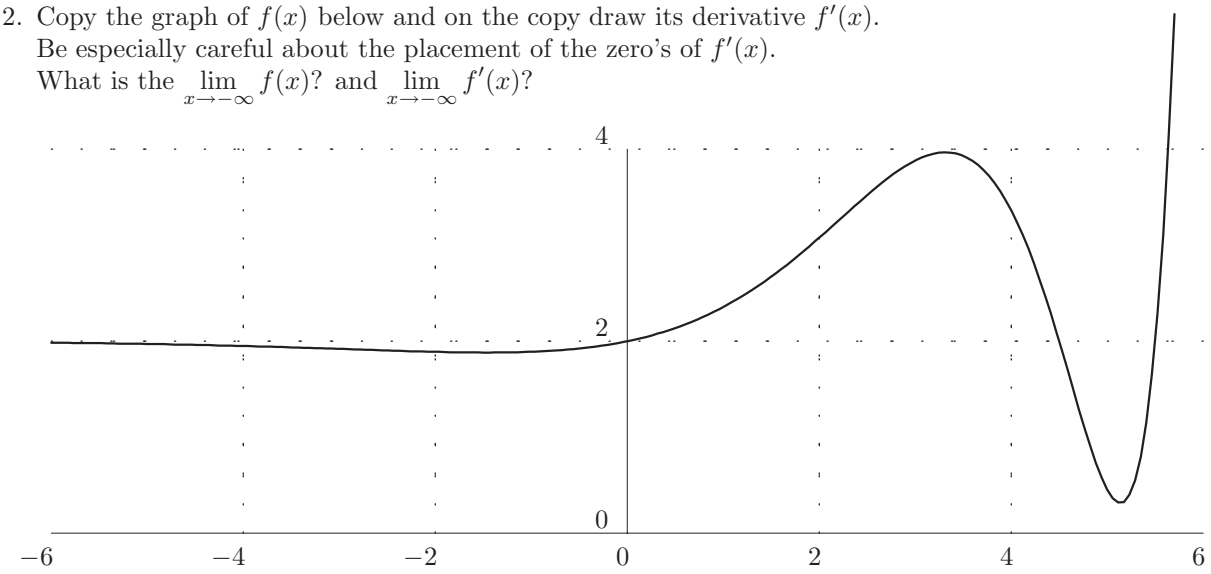
MAC 2311 Calculus 1 **Test 1** 13 Sep 2004

Directions: Show **ALL** work for credit; Give **EXACT** answers when possible; Start each problem on a **SEPARATE** page; Use only **ONE** side of each page; Be neat; Leave margins on the left and top for the **STAPLE**; Calculators can be used for graphing and calculating only; Nothing written on this page will be graded;

1. The following table of the position s in furlongs versus time t in fortnights. Find the average velocity between $t = 1$ and $t = 4$, estimate the instantaneous velocity at $t = 3$ (by averaging two average velocities), and give the units of $s'(3)$.

t	1	2	3	4
s	16	64	144	256

2. Copy the graph of $f(x)$ below and on the copy draw its derivative $f'(x)$.
   Be especially careful about the placement of the zero's of $f'(x)$.
   What is the $\lim_{x\to-\infty} f(x)$? and $\lim_{x\to-\infty} f'(x)$?



3. Find the limits.

   (a)
   $$\lim_{x\to 3} \frac{x^2 - 9}{x^3 - 5x^2 + 6x}$$

   (b)
   $$\lim_{h\to 0} \frac{\sqrt{x+5h} - \sqrt{x}}{h}$$

4. Using the limit definition of the derivative, find the derivative $f'(2)$ when $f(x) = x^5$. Pascal wants to help you.

   Use your answer to find the equation of the tangent line to $f(x)$ at $x = 2$.

There is more test on the other side

5. For the function g whose graph is given below, state the value of each quantity, if it exists. If it does not exist explain why.

(a) $\lim_{x \to -2^-} g(x)$ (b) $\lim_{x \to -2^+} g(x)$ (c) $\lim_{x \to -2} g(x)$ (d) $g(-2)$

(e) $\lim_{x \to 2^-} g(x)$ (f) $\lim_{x \to 2^+} g(x)$ (g) $\lim_{x \to 2} g(x)$ (h) $g(2)$

(i) $\lim_{x \to 4^-} g(x)$ (j) $\lim_{x \to 4^+} g(x)$ (k) $\lim_{x \to 0} g(x)$ (l) $g(0)$