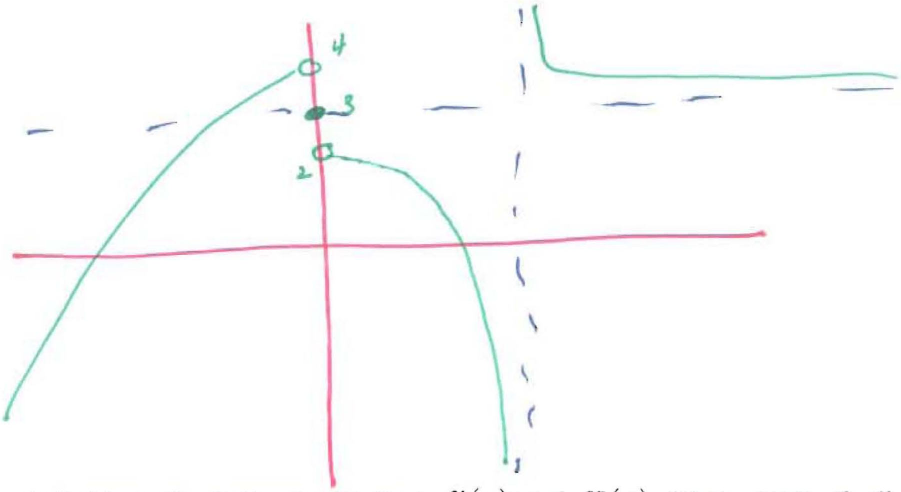
Quiz #3 Math 101 -152

| Name: | I.D. |
|---|---|

1. Sketch the graph of an example of a function $f$ that satisfies all of the given conditions.

$f(0)=3,\quad \lim_{x\to 0^-} f(x)=4,\quad \lim_{x\to 0^+} f(x)=2,$

$\lim_{x\to -\infty} f(x)=-\infty,\quad \lim_{x\to 4^-} f(x)=-\infty,\quad \lim_{x\to 4^+} f(x)=\infty,\quad \lim_{x\to\infty} f(x)=3$



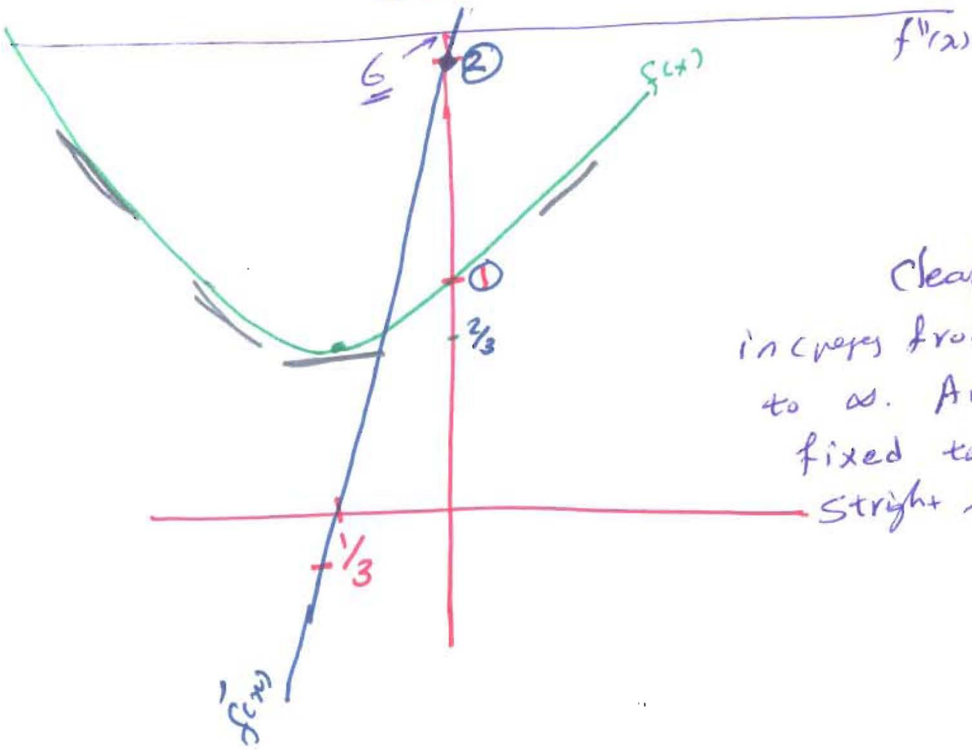

2. Use the definition of a derivative to find $f'(x)$ and $f''(x)$. Then graph $f, f'$, and $f''$ on a common screen and check to see if your answers are reasonable.

$f(x)=3x^2+2x+1$

$$g(x)=f'(x)=\lim_{h\to 0}\frac{3(\cancel{x^2}+2xh+h^2)+\cancel{2x}+2h+\cancel{1}-\cancel{3x^2}-\cancel{2x}-\cancel{1}}{h}=\lim_{h\to 0}\frac{\cancel{h}[6x+h+2]}{\cancel{h}}$$

$$=6x+2$$

$$f''(x)=g'(x)=\lim_{h\to 0}\frac{\cancel{6(x+h)}+\cancel{2}-\cancel{6x}-\cancel{2}}{h}=\lim_{h\to 0}\frac{6\cancel{h}}{\cancel{h}}=6$$




$f(-1/3)=2/3$

Clearly the slope of f(x) increases from $-\infty$ to zero at $-1/3$ then to $\infty$. And the slope of f'(x) is fixed to be 6 because it is stright line.