Name: ______________________

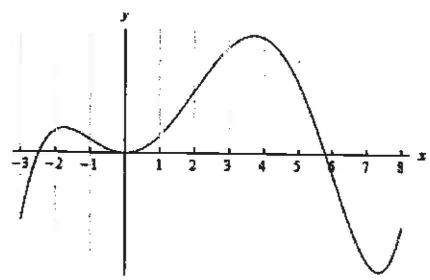
Clear your desk of everything excepts pens, pencils and erasers. If you have a question raise your hand and I will come to you.

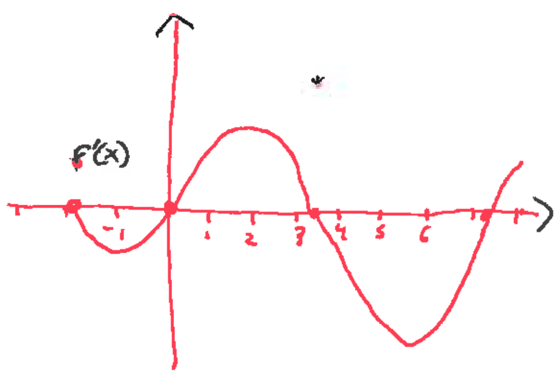
1. (2 points) **Fill-in-the-Blank. No work needed. No partial credit available.**
   The function

$$f(x) = \begin{cases} x+1 & x \leq 1 \\ \frac{1}{2-x} & 1 < x < 3 \\ \cos(\pi x) & x \geq 3 \end{cases}$$

   is continuous on the interval(s) $(-\infty, 1) \cup (1, 2) \cup (2, \infty)$

2. (1 point) Sketch a graph of the derivative of the following function.





Extra Work Space.

Problem 1

Potential issues are $x=1, x=2, x=3$.

$x=1$ $\lim_{x \to 1^-} f(x) = 1+1 = 2$ $\lim_{x \to 1^+} f(x) = \frac{1}{2-1} = 1$ Limit does not exist

$x=2$ $f(x) = \frac{1}{2-x}$ Function is not defined.

$x=3$ $\lim_{x \to 3^-} f(x) = \frac{1}{2-3} = -1$ $\lim_{x \to 3^+} \cos(\pi x) = \cos(3\pi) = -1$ Continuous!

Continue on to back side

3. (2 points) Find the derivative of $s(t) = \sqrt{2t-1}$ using the definition of the derivative. (This means your solution should involve a computation involving a limit.)

$$s'(t) = \lim_{h \to 0} \frac{\sqrt{2(t+h)-1} - \sqrt{2t-1}}{h} \left(\frac{\sqrt{2(t+h)-1} + \sqrt{2t-1}}{\sqrt{2(t+h)-1} + \sqrt{2t-1}} \right)$$

$$= \lim_{h \to 0} \frac{(2(t+h)-1) - (2t-1)}{h\left(\sqrt{2(t+h)-1} + \sqrt{2t-1}\right)}$$

$$= \lim_{h \to 0} \frac{2h}{h\left(\sqrt{2(t+h)-1} + \sqrt{2t-1}\right)}$$

$$= \lim_{h \to 0} \frac{2}{\sqrt{2(t+h)-1} + \sqrt{2t-1}}$$

$$= \frac{2}{2\sqrt{2t-1}}$$

$$= \frac{1}{\sqrt{2t-1}}$$

_____ / 5