EXTRA PRACTICE FOR CHAPTER 2

1. Sketch a graph of a function, $f(x)$, with the following properties:

$f(3) = 6$, $f'(3) = 0$, $f'(8)$ is undefined,

$\lim_{x \to -\infty} f(x) = 0$, $\lim_{x \to \infty} f(x) = +\infty$,

$f''(x) > 0$ for $x < 1$, $x > 8$,

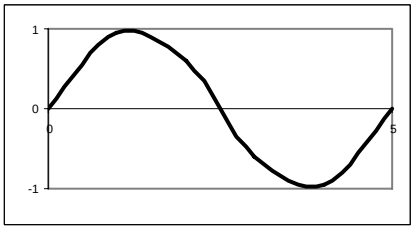
$f(x)$ is continuous and defined everywhere.

2. Each of the graphs below shows the position of a particle moving in a line as a function of time. During the indicated time interval, which particle has

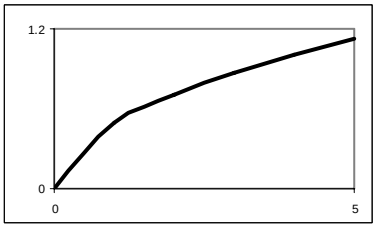
A) Constant velocity ____ B) Greatest initial velocity ____ C) Greatest average velocity ____

D) Zero average velocity ____ E) Zero acceleration ____ F) Positive acceleration ____

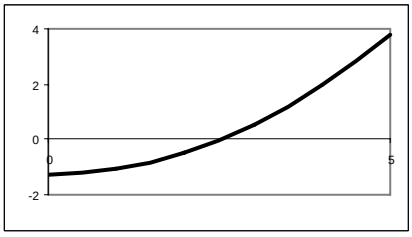
I.



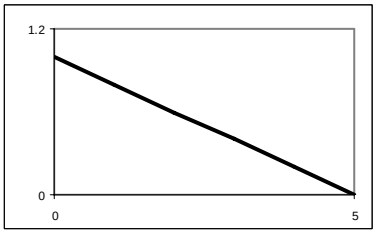
II.



III.



IV.



3. Suppose $f(x)$ is increasing and concave up everywhere and $f(A)=4$, $f'(A)=2.2$, $h=0.05$.

A. Estimate the values of $f(A-h)$ and $f(A+h)$.

B. Are your estimates from part A larger or smaller than the true function values? How do you know?

4. Consider the function $g(x)=\begin{cases} \ln x & x>1 \\ 1.7^x - C & x\le 1 \end{cases}$.

A. Determine the value of *C* so that this function is continuous at $x=1$.

B. Now determine if this function is differentiable at $x=1$. Prove it.

5. Let $p(h)$ be the pressure on a diver (in dynes per square cm) at a depth of *h* meters below the surface of the ocean. Determine what each of the quantities below represent in practical terms. Include units.

A. $p(100)$

B. $p(h+20)$

C. $p^{-1}(15)$

D. $p'(100)$

6. Let $f(t)=\dfrac{t^3|4-2t|}{t^2-4}$. Find the following limits and determine what graphical features they represent. Finally try to sketch an accurate graph of this function showing all its important characteristics.

A. $\lim\limits_{t\to 2^+} f(t)$ B. $\lim\limits_{t\to 2^-} f(t)$ C. $\lim\limits_{t\to -2^+} f(t)$ D. $\lim\limits_{t\to -2^+} f(t)$