Math 5 Calculus Wiseman 9/9/02

1) a) Let $f(x) = 2x + 1$. Use the definition of the derivative to calculate $f'(x)$.

b) Let $g(x) = 2x + 1{,}000{,}000{,}000{,}000{,}000{,}000{,}000$. What is $g'(x)$?

a) $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \to 0} \frac{2(x+h) + 1 - (2x+1)}{h}$

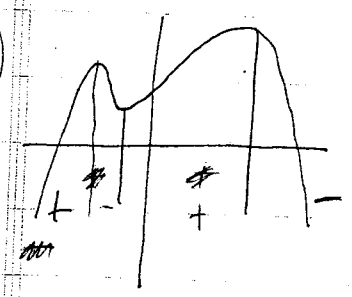
$= \lim_{h \to 0} \frac{2h}{h} = 2$

b) Since $g(x) = f(x) + \text{constant}$,

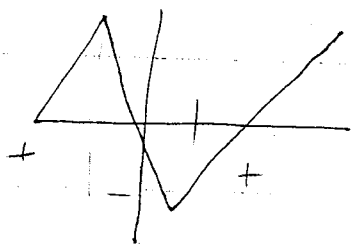
$g'(x) = f'(x) = 2$

2) Sketch the graph $y = f'(x)$ for each of the following functions.

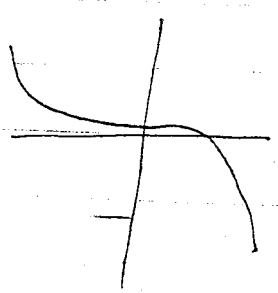
a)

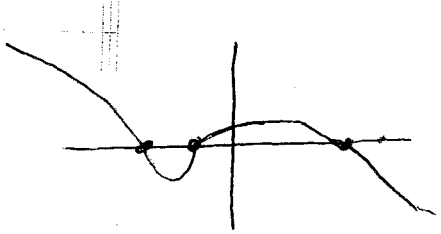


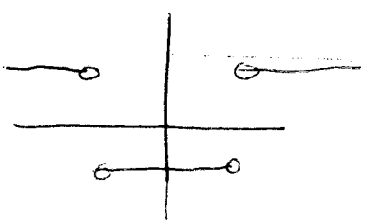
b)

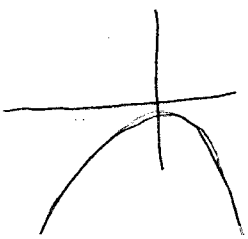


c)



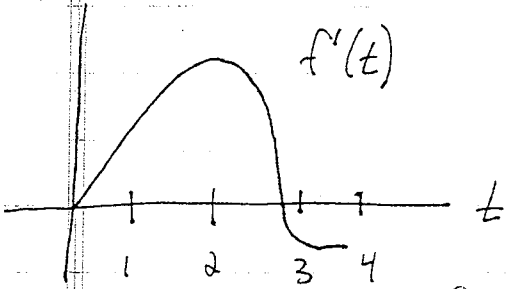






(OVER)

3) Let $f(t)$ be the height of a ball at time t. If the graph below shows the <u>derivative function</u> $f'(t)$, when does the ball reach its maximum height?



It reaches its maximum height when it stops rising and starts falling, that is, when the derivative goes from positive to negative, at roughly $t = 2.75$.