AP Calculus Test: Intro to Derivatives **Name:_____**

Total Marks= $\frac{\quad}{50}$

Section A- True or false page (one mark each) $\frac{\quad}{6}$

Simply put T (for true) F (for false) in blank on the right of each statement.
For any function y= $f(x)$:

A If $f'(a)=0$ and $f''(a)=0$, then $f(x)$ has a relative maximum at x=a. ___

B An inflection point occurs where $f'(x)$ has a relative maximum ___

C An inflection point occurs where $f(x)$ has a relative maximum ___

D $f(x)$ is decreasing at x= c if $f'(x)<0$ at x=c ___

E If $f'(x)$ is increasing at x=b then f(x) is concave up at x=b ___

F $f(x)=x^3+x$ is an even function ___

G If $f(x)=x^3+x$, then $f'(x)$ is an even function. ___

Section B- Multiple Choice- Show working in this section for questions worth **more** than one mark- Calculators may be used, but are not needed. $\frac{\quad}{13}$

1. If $f'(x)=(x-1)^3(2x-5)^4$, then, at x=$\frac{5}{2}$ graph of f(x) has: (2 marks)

a) a relative maximum b) a relative minimum c) an x intercept

d) a change in concavity e) none of these

2. If $h(x)=f(f(x))$ and it is known that (3 marks)
$f(4)=2, f(2)=6, f'(2)=-3, f'(4)=-1$,
Then the value of $h'(4)$ is

a) 3 b) -3 c) 2 d) -2 e) -6

3. If $y = \frac{u+1}{u^2}$ and $u = \sqrt{2x+1} - x^2$, then $\frac{dy}{dx}$ when $x = 0$ is : (4 marks)

a) 3 b) -3 c) $\frac{3}{2}$ d) $\frac{-3}{2}$ e) -6

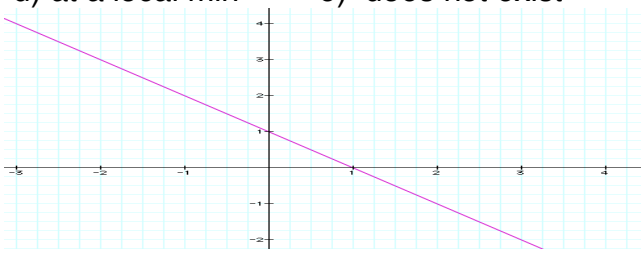
4.The equation of the tangent to $y = (x-1)^5$ at its **y** intercept is : (3 marks)

a) y = x + 1 b) y= 0 c) y = 5x - 1 d) y= -5x - 1 e) y = x - 1

5. Shown below is the graph of the **second derivative** of a function, $f''(x)$.
At x= 2 , the graph of $f(x)$ is : (one mark)

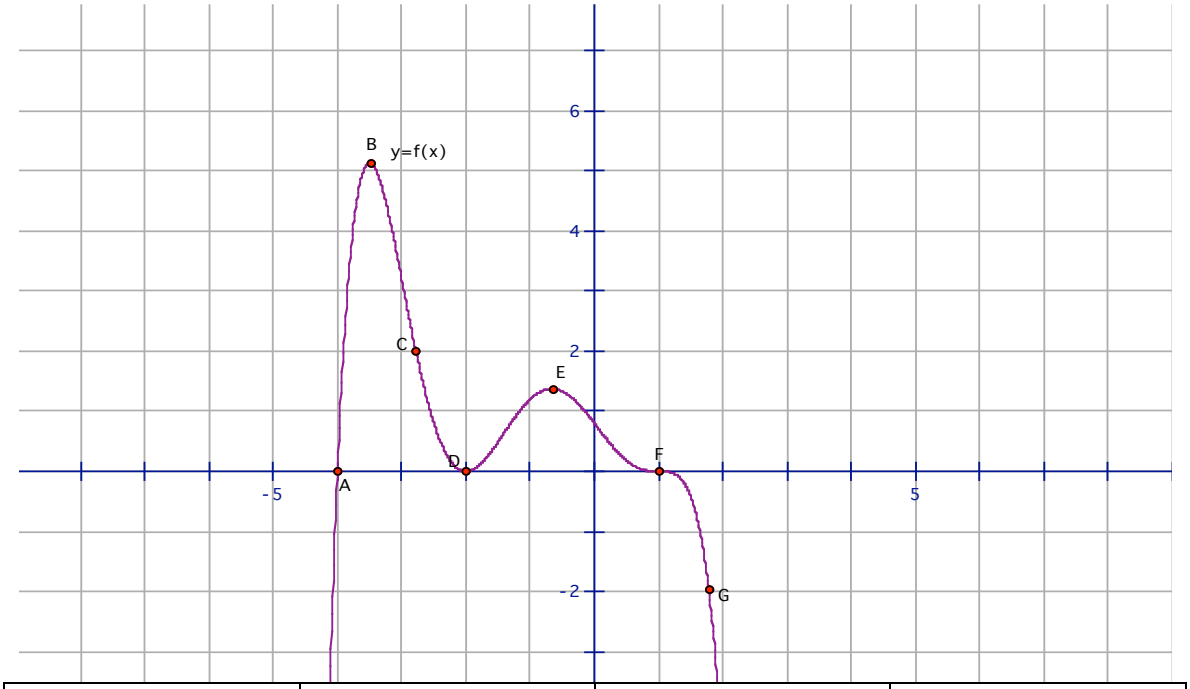
a) concave down b) concave up c) at a local max

d) at a local min e) does not exist



Section C- $\overline{31}$

1. a) For the graph of $f(x)$ shown, fill in the table below with + or – or 0. (7)



Point	f(x)	f'(x)	f"(x)
A			
B			
C			
D			
E			
F			
G			

b) Use the graph to estimate $f'(0)$: (1)

2. a) It is known that the graphs $f(x) = \dfrac{ax-1}{2x+1}$ and $g(x) = bx^2 + 5x - 3$ are tangent to one another at x= -1. Find the values of a and b.

b) Find the equation of the common tangent at x= -1

c) Where do the graphs of $f(x)$ and $g(x)$ intersect each other again? (10 marks total)

3. a)Show that the point P(8,-1) does NOT lie on the curve $y = \frac{1}{x}$ (1)

b) Find the equation of the tangent(s) to $y = \frac{1}{x}$ which pass through point P. (5)

4. a) Find the slope of the tangent to $f(x) = 2\sqrt{5+x}$ **using first principles**.(4)

b) Consider the function $h(x) = \dfrac{f(x)}{g(x)}$. Find a possible function $g(x)$ such that $h(x)$ has a horizontal tangent at $x = -1$. (3)

Note: As before, $f(x) = 2\sqrt{5+x}$