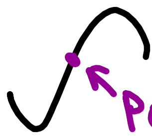
8. **1998 #16 (BC) - No Calc:** If f is the function defined by $f(x) = 3x^5 - 5x^4$, what are all the x-coordinates of points of inflection for the graph of f?

a. -1
b. 0
c. 1
d. 0 and 1
e. -1, 0, and 1

pts where concavity changes



Point of inflection

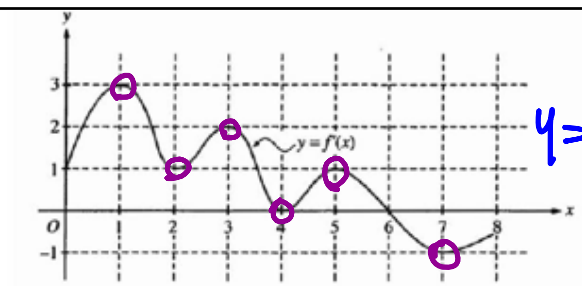
f'' $+ \to -$ or $- \to +$

$f' = 15x^4 - 20x^3$

$f'' = 60x^3 - 60x^2$

$= 60x^2(x-1)$

0 m.2 $\quad$ 1



$y = f'(x)$

The function f is defined on the closed interval $[0, 8]$. The graph of its derivative f' is shown above. How many points of inflection does the graph of f have?

a. Two
b. Three
c. Four
d. Five
e. $\boxed{\text{Six}}$

f'' $+ \to -$ or $- \to +$

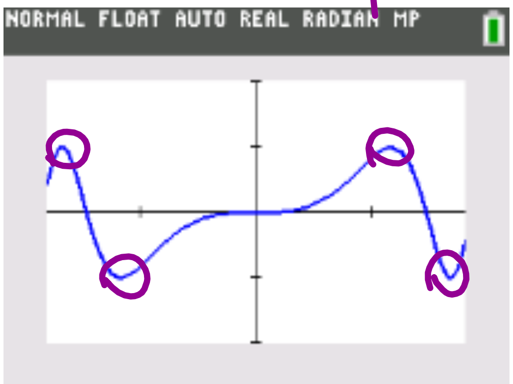
f' inc → dec or dec to inc

(L. max) $\quad$ (L. min)

f points of inflection

10. **2003 #86 (BC) - Calc OK:** Let f be the function with derivative defined by $f'(x) = \sin(x^3)$ on the interval $-1.8 < x < 1.8$. How many points of inflection does the graph of f have on this interval?

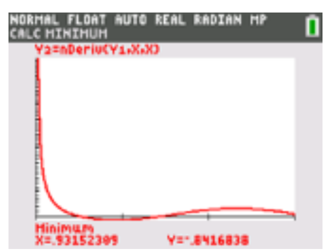
a. Two b. Three c. Four d. Five e. Six



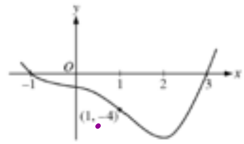
11. **1997 #80 (BC) - Calc OK:** Let f be the function given by $f(x) = \cos(2x) + \ln(3x)$. What is the least value of x at which the graph of f changes concavity?

a. 0.56 b. 0.93 c. 1.18 d. 2.38 e. 2.44

POI



❸ **2009B #5 (AB & BC) a,b,c – No Calc**



Graph of f'

Let f be a twice-differentiable function defined on the interval $-1.2 < x < 3.2$ with $f(1) = 2$. The graph of f', the derivative of f, is shown above. The graph of f' crosses the x-axis at $x = -1$ and $x = 3$ and has a horizontal tangent at $x = 2$. Let g be the function given by $g(x) = e^{f(x)}$.

(a) Write an equation for the line tangent to the graph of g at $x = 1$.

(b) For $-1.2 < x < 3.2$, find all values of x at which g has a local maximum. Justify your answer.

(c) The second derivative of g is $g''(x) = e^{f(x)}\left[\left(f'(x)\right)^2 + f''(x)\right]$. Is $g''(-1)$ positive, negative, or zero? Justify your answer.

a) $x = 1$, $y = g(1) = e^{f(1)} = e^2$

$$m = g'(1) = e^{f(x)} \cdot f'(x)\Big|_{x=1} = e^{f(1)} \cdot f'(1) = e^2 \cdot (-4)$$

$$\boxed{y - e^2 = -4e^2(x-1)}$$