Example solutions:

#1   FIRST DERIVATIVE TEST ANSWERS $f(x) = x^3 - 3x^2 - 24x + 2$

$f(x) = x^3 - 3x^2 - 24x + 2$

$f'(x) = 3x^2 - 6x - 24$

$f'(x) = 3(x^2 - 2x - 8)$

$f'(x) = 3(x+2)(x-4)$

$0 = 3(x+2)(x-4)$

CRITICAL POINTS @

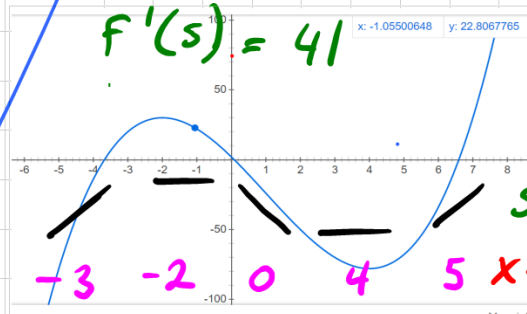$x = -2, \ x = 4$

1st DERIVATIVE TEST

$f'(-3) = 3(-3)^2 - 6(-3) - 24 = 21$

$f'(0) = -24$

$f'(5) = 41$

SLOPES

−3 −2   0   4   5 X-VALUES

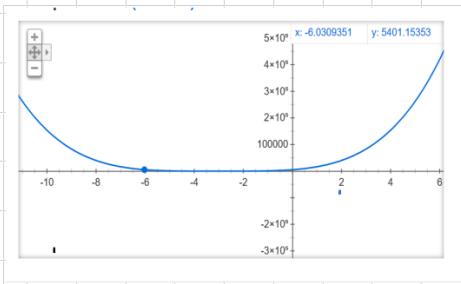MAX @ x = -2, Min @ x = 4

#2 EX.2

$f(x) = (2x + 6)^4$

$f'(x) = 4(2x+6)^3 \cdot 2$

$0 = 4(2x+6)^3 \cdot 2$

$0 = (2x+6)^3$

$x = -3$ CRITICAL POINT

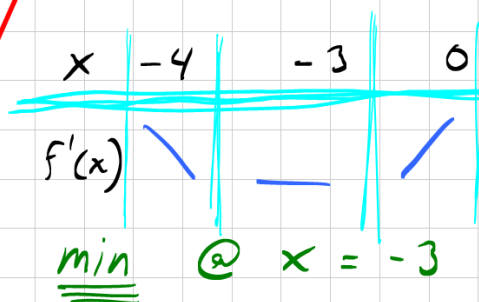FIRST DERIVATIVE TEST

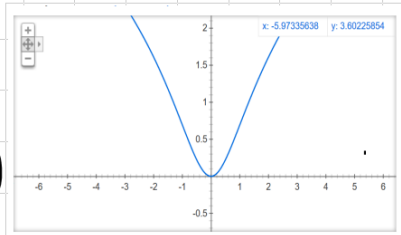$f'(-4) = 4(2(-4)+6)^3 \cdot 2 = -64$

$f'(-3) = 0$

$f'(0) = 1728$

x	−4		−3		0
$f'(x)$		−			

min @ x = -3

#3

$$f(x) = \ln(x^2 + 1)$$

$$f'(x) = \frac{1}{x^2 + 1}(2x)$$

$$f'(x) = \frac{2x}{(x^2 + 1)}$$

$$0 = \frac{2x}{(x^2 + 1)}$$

CRITICAL POINT
$$x = 0$$

FIRST DERIVATIVE TEST

$$f'(-1) = -1$$
$$f'(0) = 0$$
$$f'(1) = 1$$

x	−1	0	1
f'(x)	↘	—	↗

Min @ x = 0