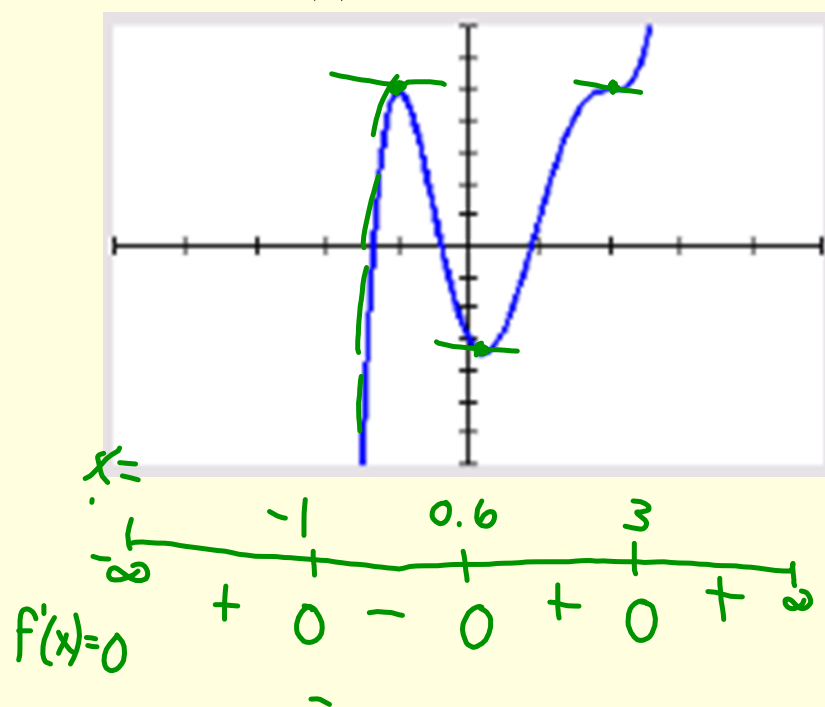


CALCULUS Unit #2 : Applications of Derivatives

7.6 The First Derivative Test

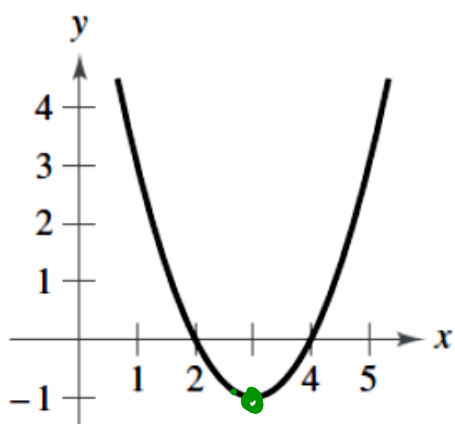
The First Derivative Test for Critical Values

$$f(x) = 5 + (x-2)^3(x+1)^2$$



The First Derivative Test

3. $f(x) = x^2 - 6x + 8$ min @ $x=3$



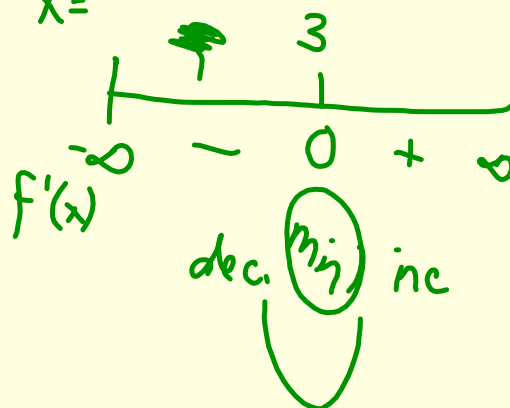
$$f'(x) = 2x - 6$$

$$0 = 2x - 6$$

$$6 = 2x$$

$$x = 3$$

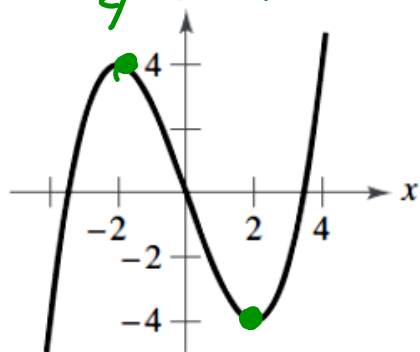
$x =$



The First Derivative Test

$$5. y = \frac{x^3}{4} - 3x = \frac{1}{4}x^3 - 3x$$

$$\left(\frac{2}{4}\right)^3 - 3(-2)$$



$$y' = \frac{3}{4}x^2 - 3$$

$$0 = \frac{3}{4}x^2 - 3$$

$$\left(\frac{4}{3}\right)3 = \frac{3}{4}x^2 \quad \left(\frac{4}{3}\right)$$

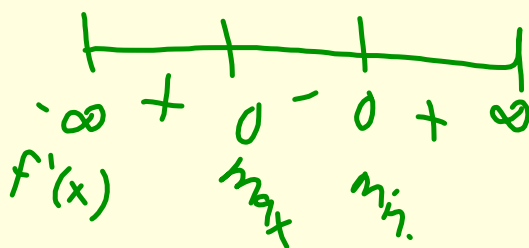
$$\sqrt{4} = \sqrt{x^2}$$

$$x = \pm 2$$

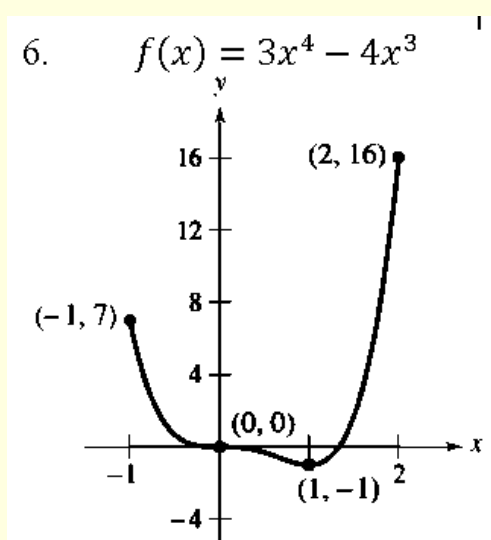
$$x =$$

$$-2$$

$$2$$



The First Derivative Test



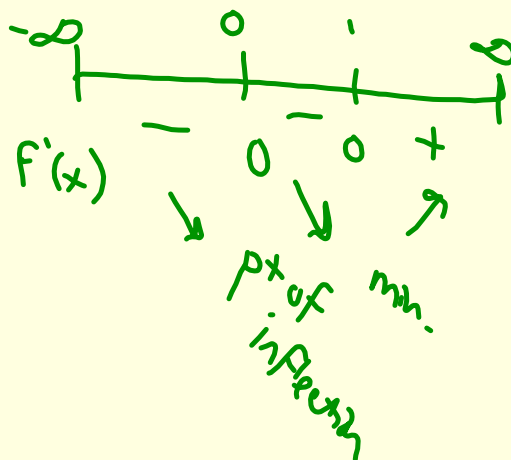
$$f'(x) = 12x^3 - 12x^2$$

$$0 = 12x^2(x - 1)$$

$$0 = 12x^2 \quad 0 = x - 1$$

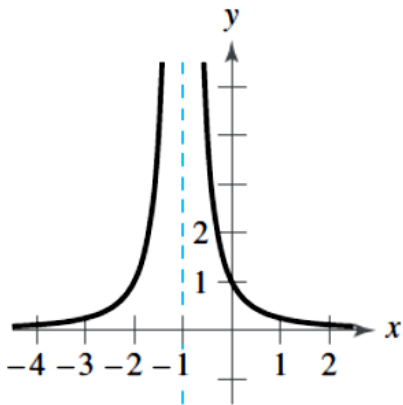
$$x = 0$$

$$x = 1$$



The First Derivative Test

7. $f(x) = \frac{1}{(x+1)^2} = (x+1)^{-2}$



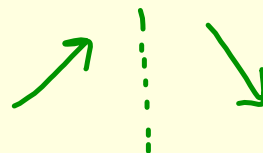
$$f'(x) = -2(x+1)^{-3}$$

$$(x+1)^3 = 0 = \frac{-2}{(x+1)^3}$$

$$x \neq -1$$

Sign chart for $f'(x)$:

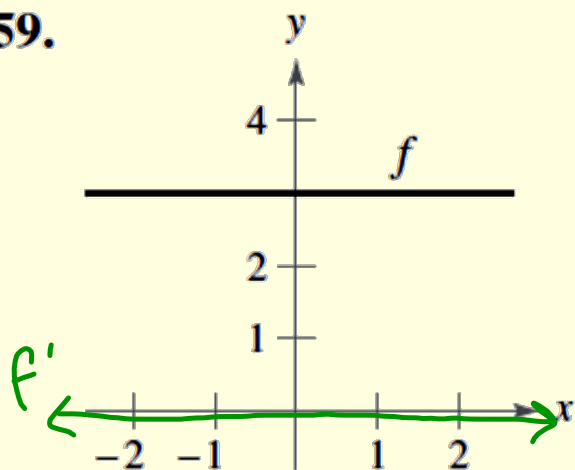
$x < -1$	$x = -1$	$x > -1$
+	∅	-



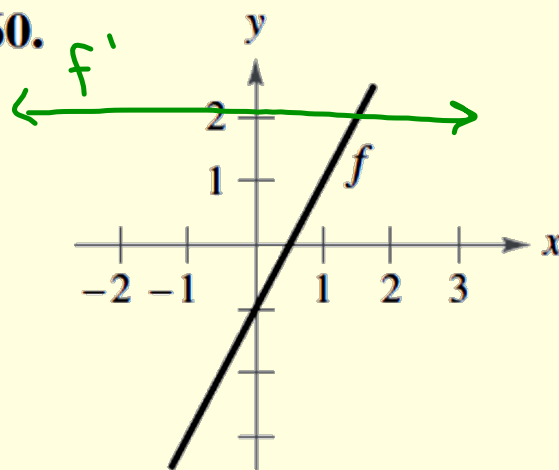
<u>$f(x)$</u>	$f'(x)$ to the left	$f'(x)$ at the critical value	$f'(x)$ to the right
Maximum	+	0	-
Minimum	-	0	+
Point of Inflection	- +	0 0	- +
Vertical Asymptote		\emptyset	

The First Derivative

59.

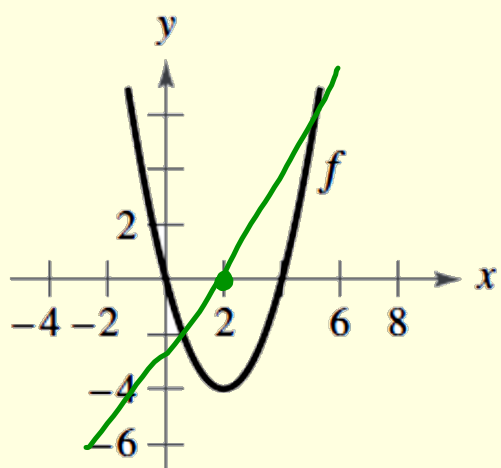


60.

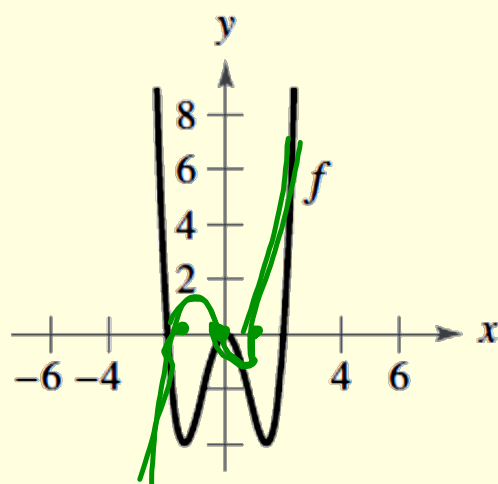


The First Derivative

61.

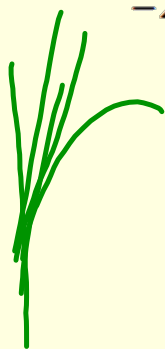
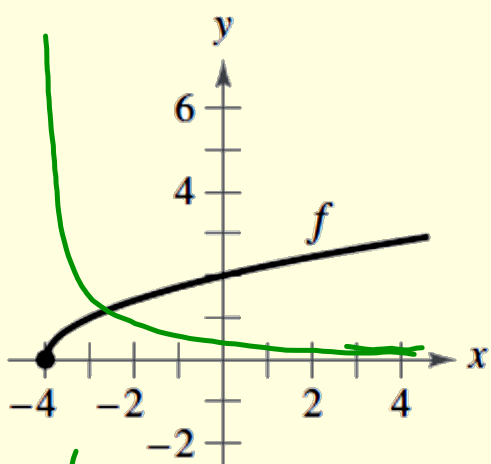


62.

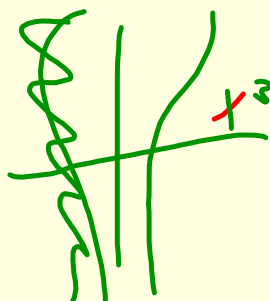
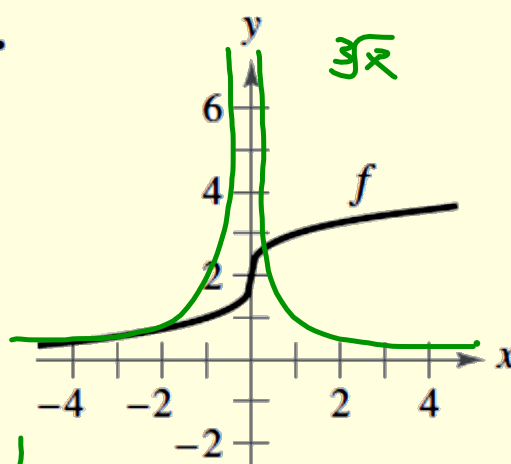


The First Derivative

63.



64.



Homework:

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