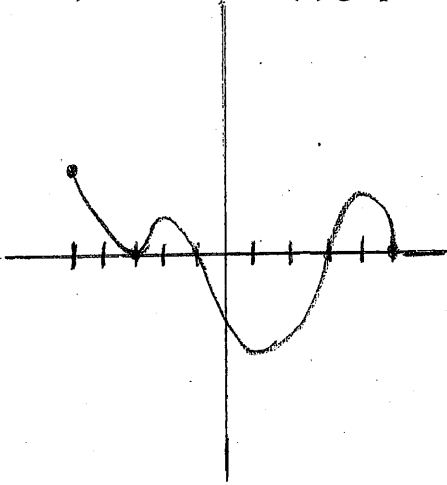


Derivative Graph Practice Problem #2:

Given the $f'(x)$ graph, find the characteristics of $f(x)$ graph:

- a) Relative minimum(s)
- b) Relative maximum(s)
- c) interval increasing
- d) interval decreasing
- e) POI
- f) interval concave up
- g) interval concave down
- h) Sketch $f(x)$ graph given points $(-5, -4)$ and $(5, 3)$. The range is $[-7, 5]$
- i) Sketch the $f''(x)$ graph



First Derivative Test, Concavity Test Practice Problem #3:

Given that $f(x) = x^3 - 3x^2 + 3$, find the characteristics of $f(x)$ graph:

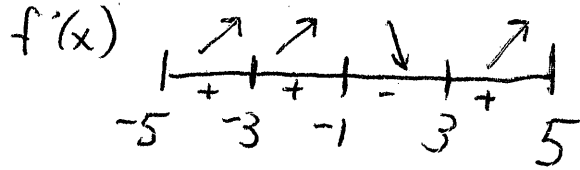
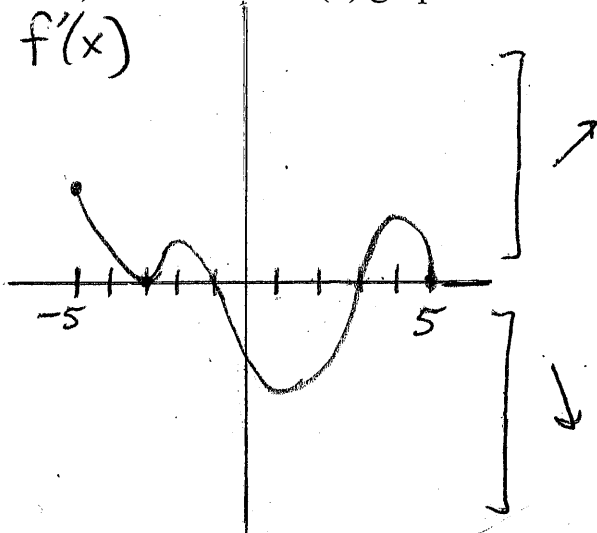
- a) Relative minimum(s)
- b) Relative maximum(s)
- c) interval increasing
- d) interval decreasing
- e) POI
- f) interval concave up
- g) interval concave down
- h) Sketch $f(x)$ graph

Derivative Graph Practice Problem #2:

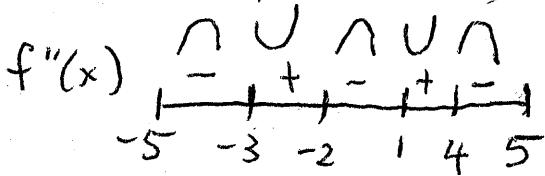
Key

Given the $f'(x)$ graph, find the characteristics of $f(x)$ graph:

- a) Relative minimum(s)
- b) Relative maximum(s)
- c) interval increasing
- d) interval decreasing
- e) POI
- f) interval concave up
- g) interval concave down
- h) Sketch $f(x)$ graph given points $(-5, -4)$ and $(5, 3)$. The range is $[-7, 5]$
- i) Sketch the $f''(x)$ graph

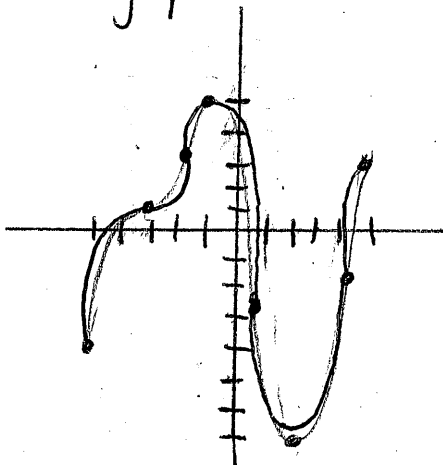


- a) Rel. min at $x = 3$ b/c $f'(x)$ changes from $-$ to $+$
- b) Rel. max at $x = -1$ b/c $f'(x)$ changes from $+$ to $-$
- c) $f(x)$ increasing $(-5, -3), (-3, -1), (3, 5)$
b/c $f'(x) > 0$
- d) $f(x)$ decreasing $(-1, 3)$ b/c $f'(x) < 0$

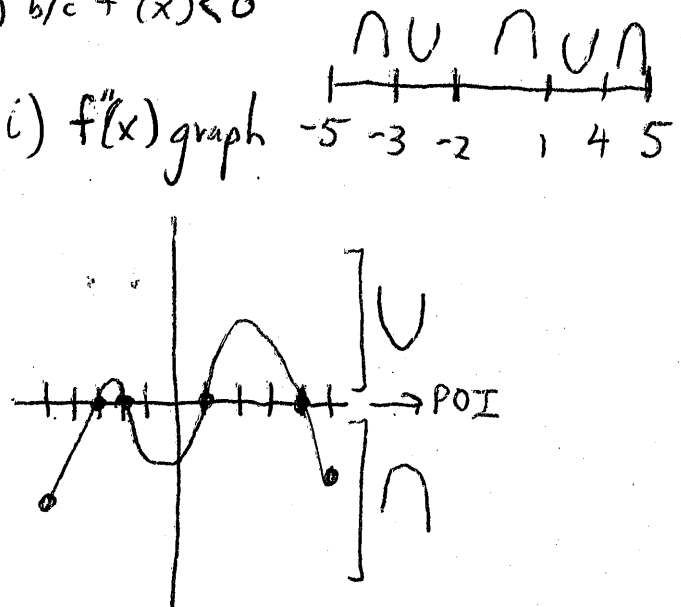


- e) POI at $x = -3, -2, 1, 4$ b/c $f''(x)$ change signs
- f) Concave up $(-3, -2), (1, 4)$ b/c $f''(x) > 0$
- g) concave down $(-5, -3), (-2, 1), (4, 5)$ b/c $f''(x) < 0$

h) $f(x)$ graph



i) $f''(x)$ graph



First Derivative Test, Concavity Test Practice Problem #3:

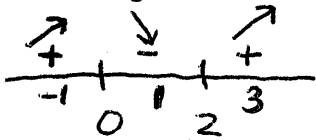
Given that $f(x) = x^3 - 3x^2 + 3$, find the characteristics of $f(x)$ graph:

- a) Relative minimum(s) b) Relative maximum(s) c) interval increasing
d) interval decreasing e) POI f) interval concave up g) interval concave down
h) Sketch $f(x)$ graph

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

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

$$x = 0, 2$$

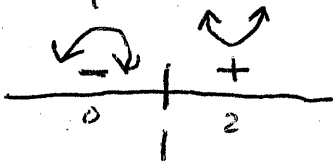


- a) Rel. min $(2, -1)$ b/c $f'(x)$ changes from $-$ to $+$
b) Rel. max $(0, 3)$ b/c $f'(x)$ changes from $+$ to $-$
c) $f(x)$ increasing $(-\infty, 0), (2, \infty)$ b/c $f'(x) > 0$
d) $f(x)$ decreasing $(0, 2)$ b/c $f'(x) < 0$

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

$$0 = 6(x-1)$$

$$x = 1$$



- e) POI at $(1, 1)$ b/c $f''(x)$ change signs
f) concave up $(1, \infty)$ b/c $f''(x) > 0$
g) concave down $(-\infty, 1)$ b/c $f''(x) < 0$

h) $f(x)$

