Calculus Review for Quiz 3.1-3.3 Name Key Hour ____

1. Multiple Choice Let $f(x) = |x+1|$. Which of the following statements about f are true?

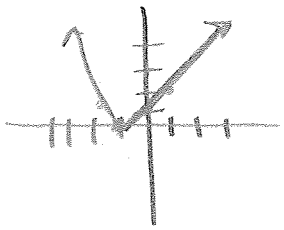
I. f is continuous at $x = -1$. yes

II. f is differentiable at $x = -1$. No, corner

III. f has a corner at $x = -1$. yes

(A) I only **(B)** II only **(C)** III only

(D) I and III only **(E)** I and II only



2. Multiple Choice If the line normal to the graph of f at the point $(1, 2)$ passes through the point $(-1, 1)$, then which of the following gives the value of $f'(1) = ?$

(A) -2 **(B)** 2 **(C)** $-1/2$ **(D)** 1/2 **(E)** 3

$m = \frac{2-1}{1-(-1)} = \frac{1}{2} \rightarrow -2$

↑ tangent line slope at $(1,2)$

3. Multiple Choice Find dy/dx if $y = \frac{4x-3}{2x+1}$.

(A) $\frac{10}{(4x-3)^2}$ **(B)** $-\frac{10}{(4x-3)^2}$ **(C)** $\frac{10}{(2x+1)^2}$

(D) $-\frac{10}{(2x+1)^2}$ **(E)** 2

$= \frac{(2x+1)(4) - (4x-3)(2)}{(2x+1)^2}$

$= \frac{8x+4-8x+6}{(2x+1)^2} = \frac{10}{(2x+1)^2}$

$f(1) = 1^4 - 4(1)^2 = -3$

4. Free Response Let $f(x) = x^4 - 4x^2$. $m=0$

(a) Find all the points where f has horizontal tangents.

(b) Find an equation of the tangent line at $x = 1$.

(c) Find an equation of the normal line at $x = 1$.

$f'(x) = 4x^3 - 8x$

a) $f'(x) = 4x^3 - 8x = 0$

$4x(x^2-2) = 0$

$x = 0$ $x^2 = 2$ $x = \pm\sqrt{2}$

b) $f'(1) = 4(1)^3 - 8(1) = -4$

$(1, -3)$

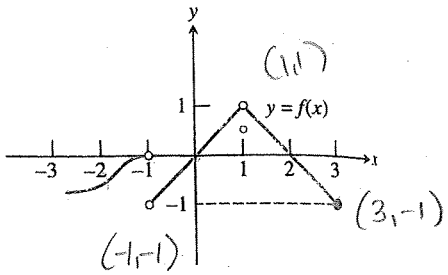
$y+3 = -4(x-1)$

c) $m = \frac{1}{4}$

$y+3 = \frac{1}{4}(x-1)$

In Exercises 59 and 60, use the graph of f to sketch the graph of f'.

59. *Sketching f′ from f*



(1,1)

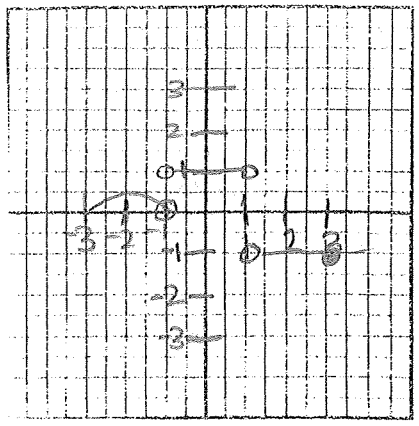
(3,−1)

(−1,−1)

(−3,−1) → m = +

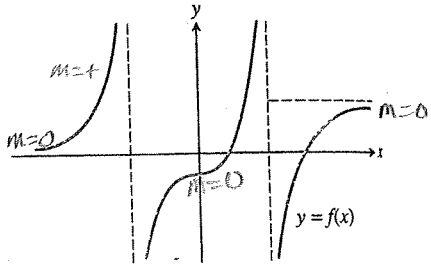
$(-1,1) \rightarrow m = \frac{1+1}{1+1} = \frac{2}{2} = 1$

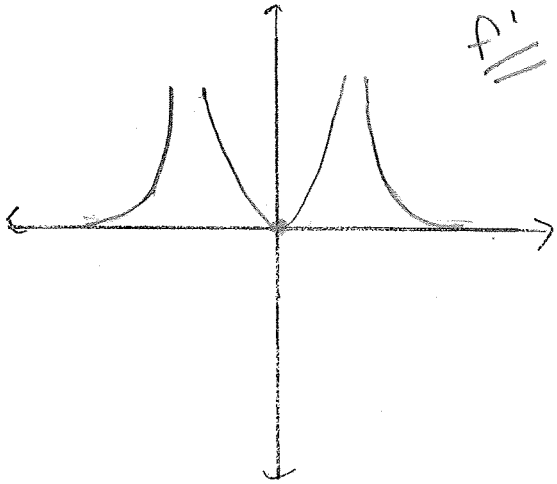
$(1,3) \rightarrow m = \frac{1+1}{1-3} = \frac{2}{-2} = -1$



f′

60. *Sketching f′ from f*

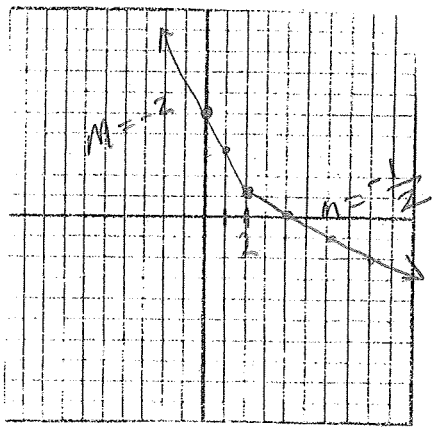




f′

62. *Sketching f from f′* Sketch the graph of a continuous function f with $f(0) = 5$ and

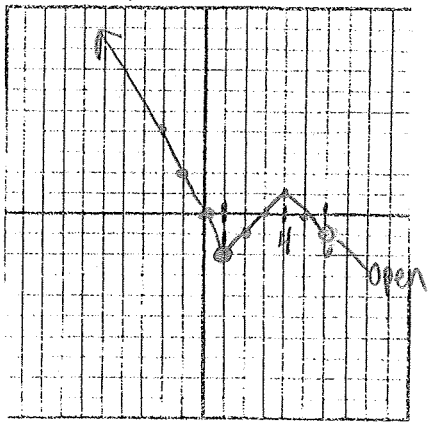
$$f'(x) = \begin{cases} -2, & x < 2 \\ -0.5, & x > 2. \end{cases}$$



f

63. *Sketching f from f′* Sketch the graph of a continuous function f with $f(-1) = 2$ and

$$f'(x) = \begin{cases} -2, & x < 1 \\ 1, & 1 < x < 4 \\ -1, & 4 < x < 6. \end{cases}$$



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