KEY

Derivatives worksheet (3.1-3.3 concepts)

1) Let $h(x) = f(x) \cdot g(x)$ and $j(x) = \dfrac{f(x)}{g(x)}$. Fill in the missing entries in the table below using the information about *f* and *g* given and the definitions of *h* and *j*.

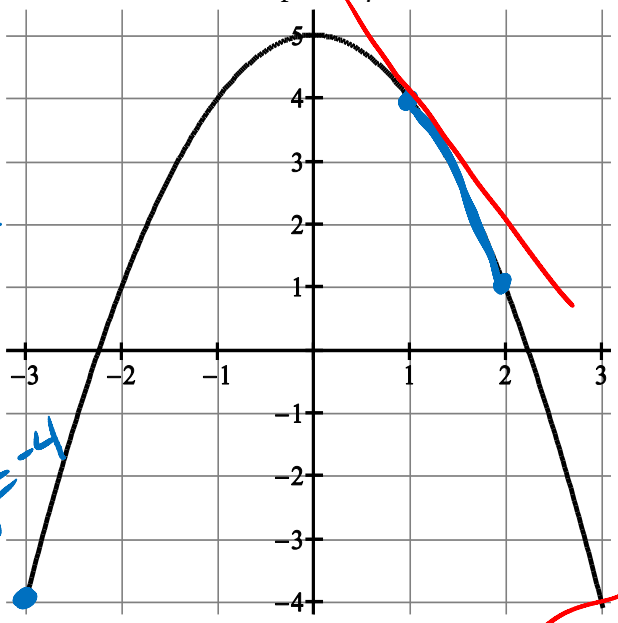
x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$	$h'(x)$	$j'(x)$
-2	1	-1	-3	4	7	$\frac{-1}{9}$
-1	0	-2	1	1	-2	-2
0	-1	2	-2	1	-5	$-\frac{3}{4}$

$h'(-2) = f(-2)\cdot g'(-2) + f'(-2)\cdot g(-2)$

$j'(-1) = \dfrac{g(-1)\cdot f'(-1) - g'(-1) f(-1)}{[g(-1)]^2}$

2) Suppose that $f(1) = 2$ and f' is the function shown below. Let $m(x) = x^3 \cdot f(x)$

Graph of f'



Value of f' = Slope of f

$f'(-3) = -4$

a) Is f(x) increasing or decreasing at x = -3?

f is decreasing since $f'(-3) = -4$

b) Find the equation of the tangent line to f(x) at x = 1. → (1, 2)

$f'(1) = 4$ ← Slope

$y - 2 = 4(x - 1)$

c) Evaluate $m'(1)$

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

$m'(1) = 2\cdot 3 + 1\cdot 4 = 10$

d) Show that m is increasing at 2

$m'(2) = f(2)\cdot 12 + 8\cdot(1) = \text{pos.}$

pos.

A Toughie!

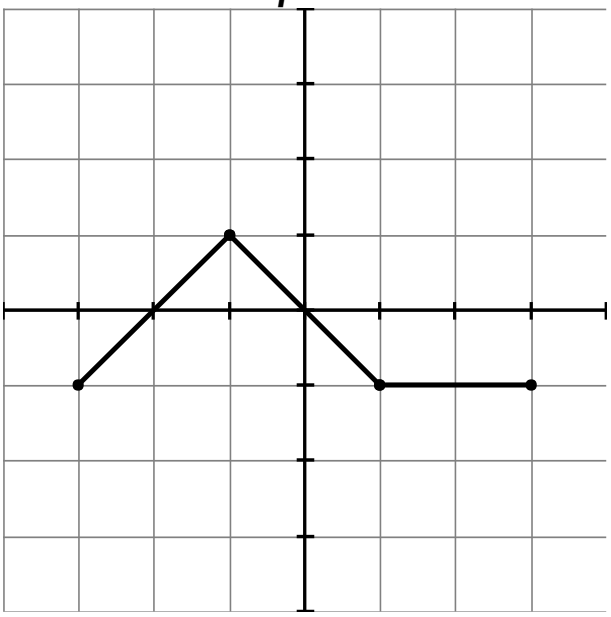
e) Estimate $f''(1)$

≈ -2

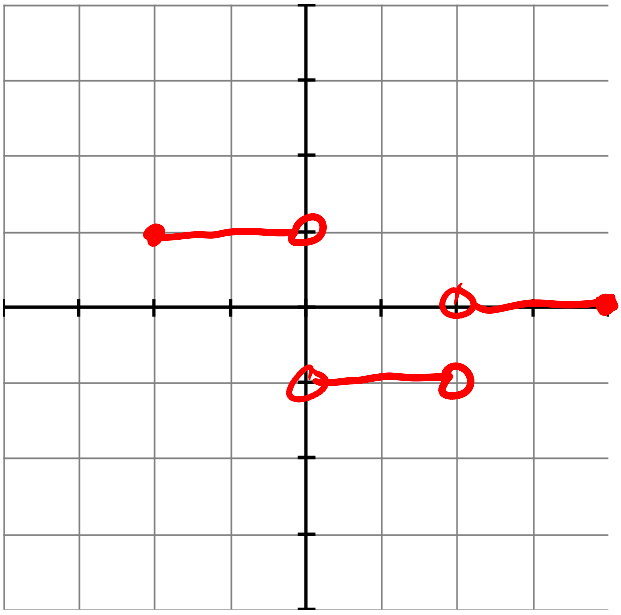
Slope of f' = deriv. of f' = f''

Given $f(x)$**, sketch** $\frac{df}{dx}$

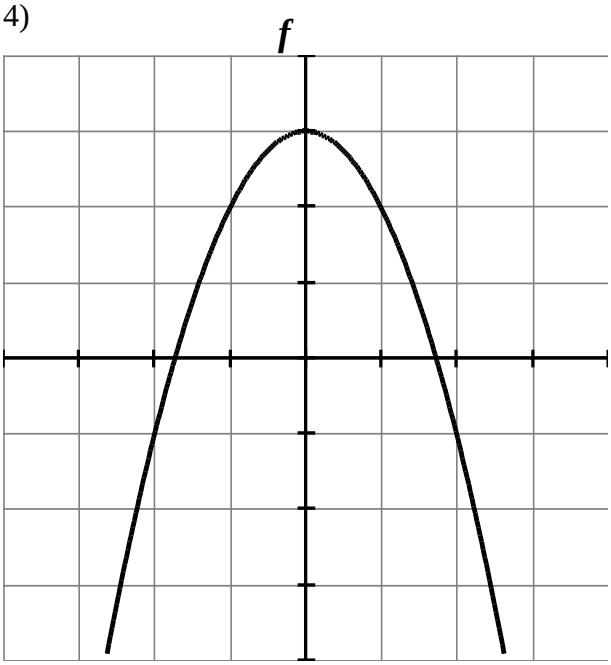
3)

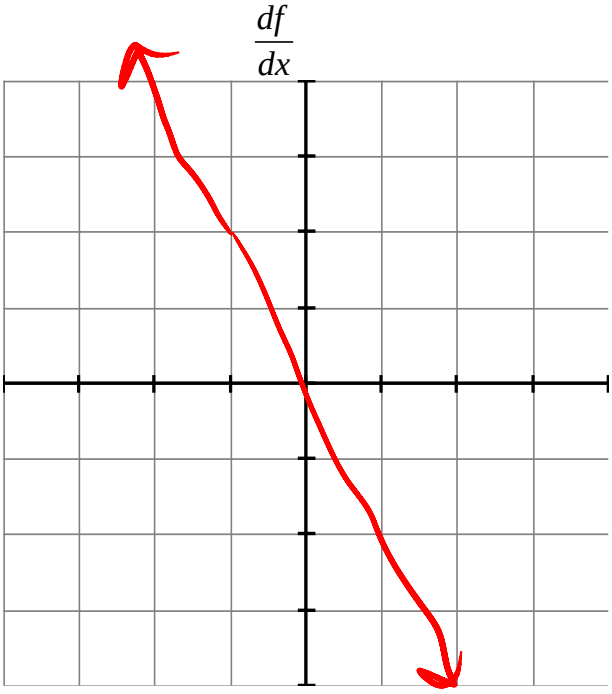


$\frac{df}{dx}$ = slope of f(x)



4)





5) Given f', sketch a possible graph for f