product rule quotient rule

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	$-\frac{3}{4}$

$1(4)+(-3)(-1)$

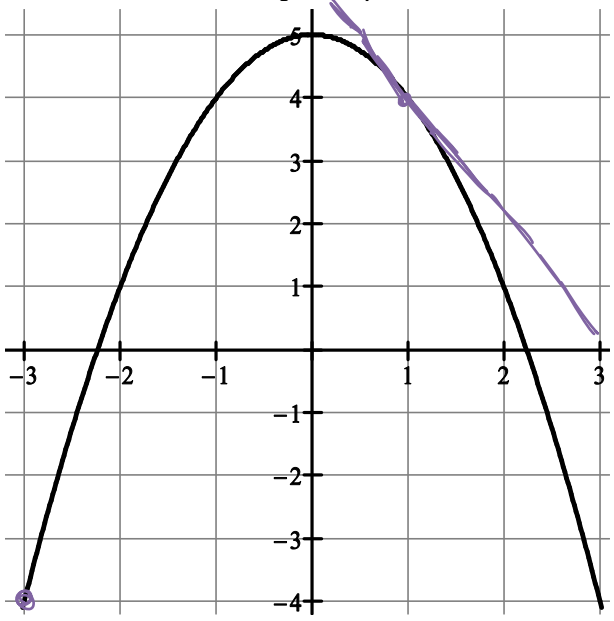
$\dfrac{1(-2)-0(1)}{1^2} = \dfrac{-2}{1} = -2$

$\dfrac{-2(2)-(-1)(1)}{(-2)^2} = \dfrac{-3}{4}$

$(-1)(1)+(-2)(2)$

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

Graph of f'



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

slope is negative, so f(x) is decreasing

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

at x=1, slope = m = 4

f(1)=2 (given)

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

product rule

c) Evaluate $m'(1)$

$u(1) = (1)^3 = 1$

$u'(1) = 3(1)^2 = 3$

$v = f(1) = 2$

$v' = f'(1) = 4$

$m'(1) = 1(4)+2(3)$

$= 10$

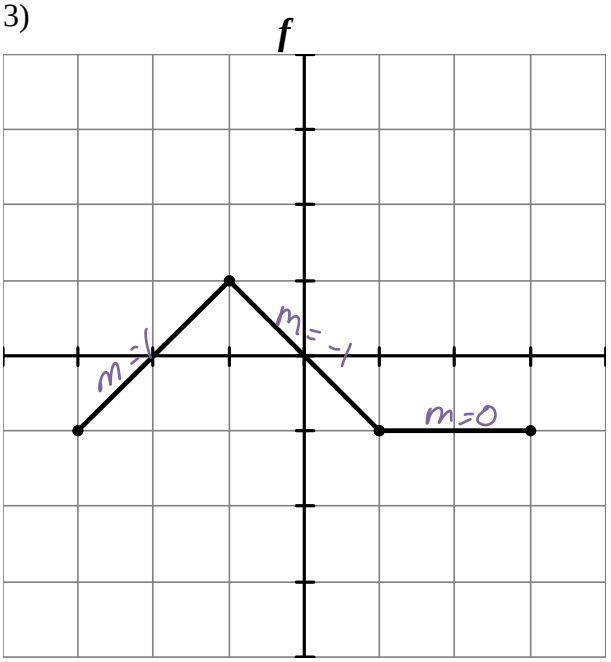
d) Show that m is increasing at 2

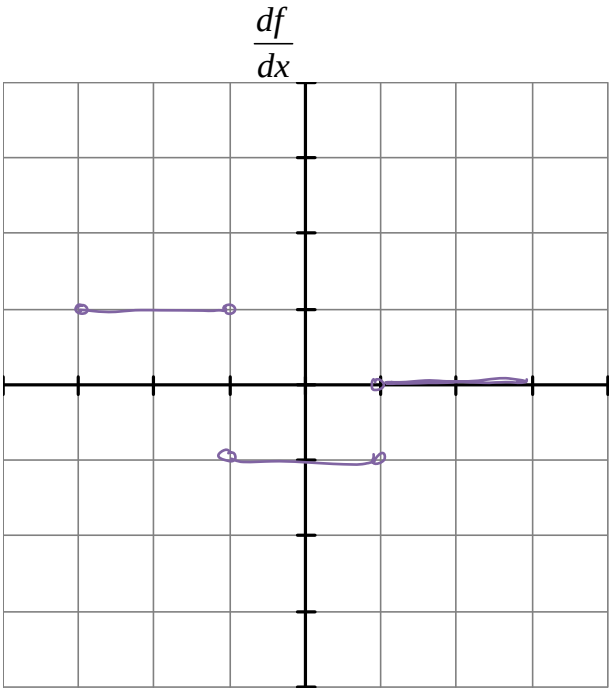
x^3 is always increasing, and $f'(2) = 1$, so also increasing.

e) Estimate $f''(1)$ about −2

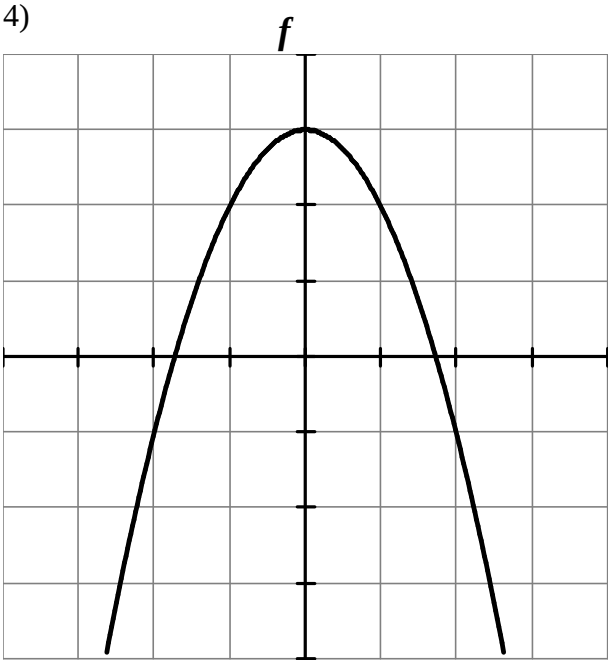
Given $f(x)$, sketch $\frac{df}{dx}$

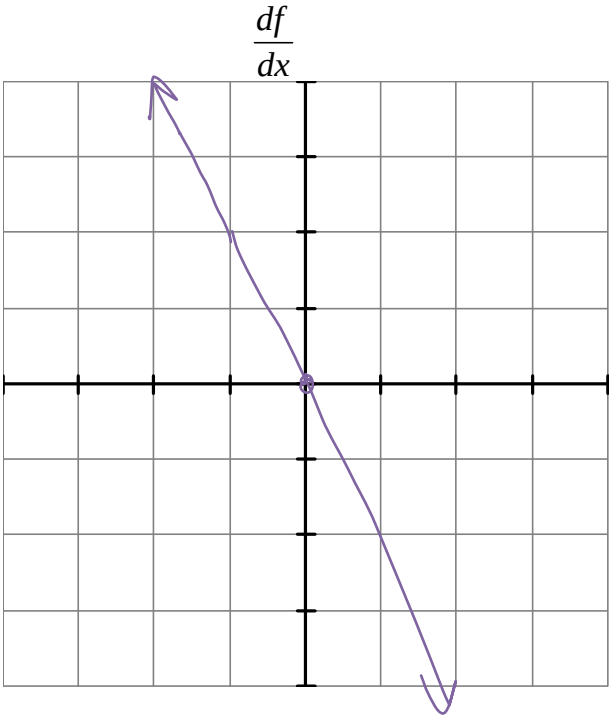
3)





4)





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