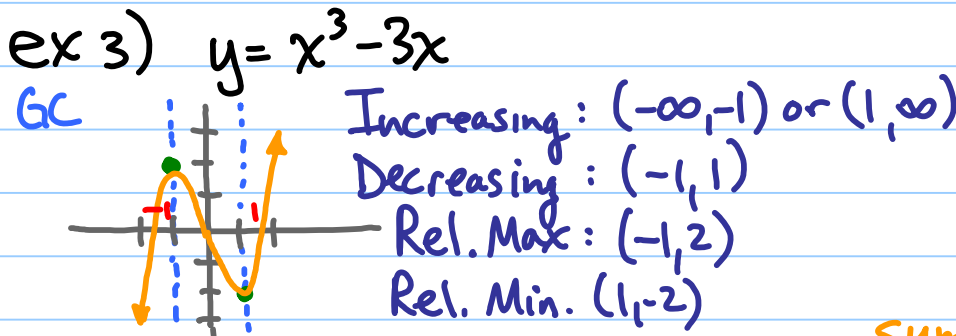
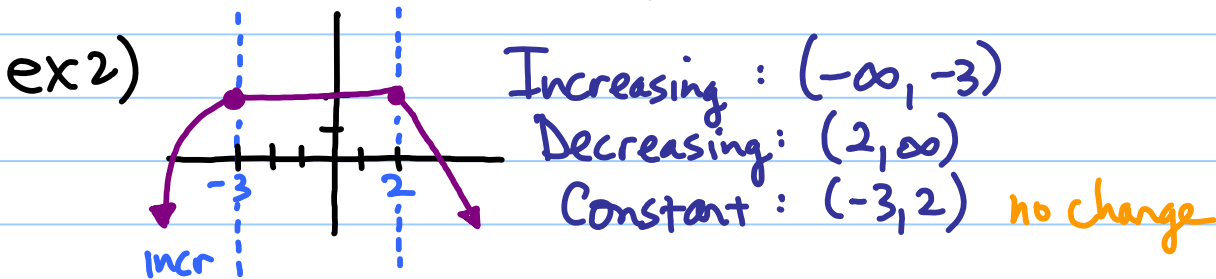
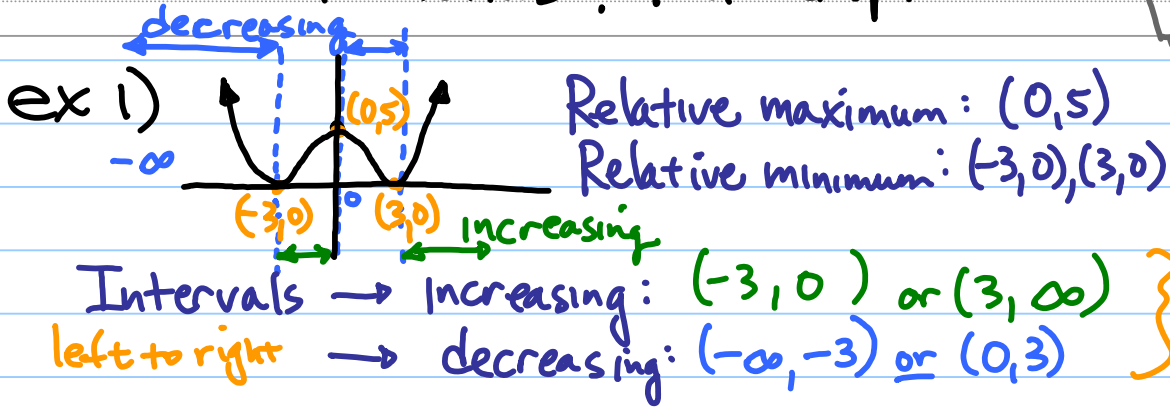




1.3 | More on Functions & Their Graphs

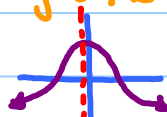


Equations/Functions : Symmetry

Even / Odd / Neither

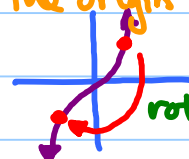
- If $f(-x) = f(x)$, same function then it is EVEN
- If $f(-x) = -f(x)$, negatized then it is ODD

reflect about y-axis



horizontal reflection

Symmetry about the origin



rotational Symmetry 180°

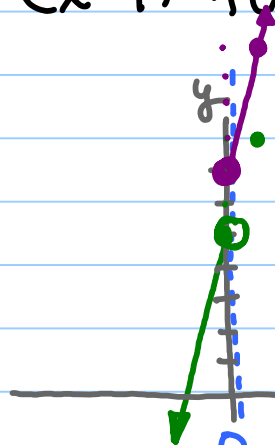
ex 4) odd, even, or neither?
 $f(x) = x^2 + 6$
test: $f(-x) = (-x)^2 + 6 = x^2 + 6 \rightarrow$ Even

ex 5) $g(x) = 7x^3 - x$
Test: $g(-x) = 7(-x)^3 - (-x) = -7x^3 + x \rightarrow$ Odd

ex 6) $h(x) = x^5 + 1$
test: $h(-x) = (-x)^5 + 1 = -x^5 + 1 \rightarrow$ neither

Piecewise-defined Functions (restriction on domain)

ex 7) $f(x) = \begin{cases} *3x+5 & \text{if } x < 0 \\ *4x+7 & \text{if } x \geq 0 \end{cases}$ } "force fields"



Graph & Find $f(-2), f(0), f(3)$.

$f(-2)$: -2 is less than 0 → use the 1st equation!

$$f(-2) = 3(-2) + 5 = -6 + 5 = -1$$

$$f(0) = 4(0) + 7 = 0 + 7 = 7$$

$$f(3) = 4(3) + 7 = 12 + 7 = 19$$

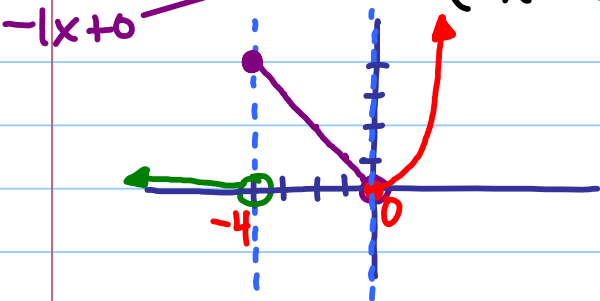
ex 8) $h(x) = \begin{cases} \frac{x^2-9}{x-3} & \text{if } x \neq 3 \\ 6 & \text{if } x = 3 \end{cases}$ Find $h(5), h(0),$ & $h(3)$.

$$h(5) = \frac{5^2-9}{5-3} = \frac{25-9}{2} = \frac{16}{2} = 8$$

$$h(0) = \frac{0^2-9}{0-3} = \frac{-9}{-3} = 3$$

$$h(3) = 6$$

ex 9) $f(x) = \begin{cases} *0 & \text{if } x < -4 \\ *x & \text{if } -4 \leq x < 0 \\ *x^2 & \text{if } x \geq 0 \end{cases}$



Graph & find the range.

Range: $y \geq 0$ or $[0, \infty)$
y-value

Difference Quotient — ratio between functions
(slope, change, ...)

$$\frac{f(x+h) - f(x)}{h}, h \neq 0$$

ex 10) $f(x) = x^2 - 4x + 3$

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

$$\frac{(x+h)(x+h) - 4x - 4h + 3 - x^2 + 4x - 3}{h} = \frac{\cancel{x^2} + xh + \cancel{xh} + h^2 - \cancel{4x} - 4h + \cancel{3} - \cancel{x^2} + \cancel{4x} - \cancel{3}}{h}$$
$$= \frac{2xh + h^2 - 4h}{h} = 2x + h - 4$$

p 172, # 2-26 EOE, 34, 38-42 even, 48, 54, 64, 68