

4.1 x^{-1}

② $f(x) = \frac{1}{x} + \ln x ; [0.5, 4]$

$f'(x) = -\frac{1}{x^2} + \frac{1}{x} = 0 \quad -\frac{1}{x^2} + \frac{1}{x} = 0 \quad x = 1, 0$

$\frac{1}{x} = \frac{1}{x^2}$

~~$f'(x) = -\frac{1}{x^2} + \frac{1}{x} = 0$~~ $x^2 = x$

$f(0.5) = \frac{1}{0.5} + \ln 0.5 = 1.307$

$f(1) = 1 + \ln 1 = 1$

MIN GLOBAL / LOCAL

$f(4) = \frac{1}{4} + \ln 4 = 1.636$

MAX GLOBAL / LOCAL

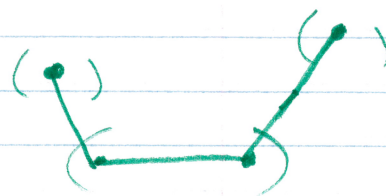
③ $f(x) = |x-2| + |x+3|$

$[-5, 5]$
 2
 -3

$f(x) = \begin{cases} -(x-2) - (x+3) & x < -3 \\ -(x-2) + (x+3) & -3 \leq x \leq 2 \\ (x-2) + (x+3) & x > 2 \end{cases}$

$f(x) = \begin{cases} -2x - 1 & , x < -3 \\ 5 & , -3 \leq x \leq 2 \\ 2x + 1 & , x > 2 \end{cases}$

$f'(x) = \begin{cases} -2 & , x < -3 \\ 0 & , -3 \leq x \leq 2 \\ 2 & , x > 2 \end{cases}$



$f(-5) = 9$ LOCAL MAX

$f(-3 \leq x \leq 2) = 5$ GLOBAL / LOCAL MIN

$f(5) = 11$ GLOBAL MAX
 LOCAL

4.1

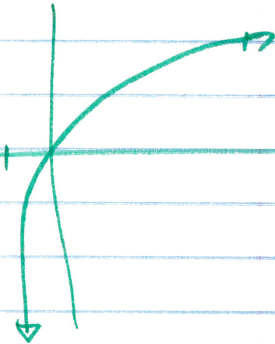
⑬ $h(x) = \ln(x+1)$

$[0, 3]$

$h'(x) = \frac{1}{x+1} \quad x \neq -1$

$h(0) = \ln(0+1) = 0$ MIN G/L

$h(3) = \ln(3+1) = \ln 4$ MAX G/L

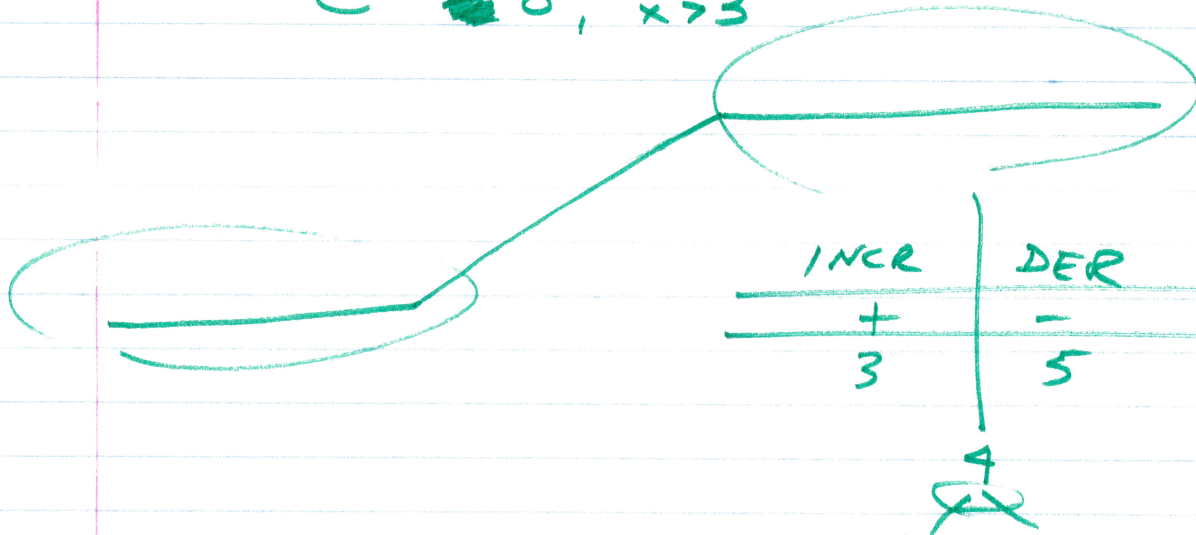


⑬③ $h(x) = |x+2| - |x-3|$

$h(x) = \begin{cases} -(x+2) - (x-3) & , x < -2 \\ (x+2) - (x-3) & , -2 \leq x \leq 3 \\ (x+2) + (x-3) & , x > 3 \end{cases}$

$h(x) = \begin{cases} -5, & x < -2 \\ 2x-1, & -2 \leq x \leq 3 \\ 5, & x > 3 \end{cases}$

$h'(x) = \begin{cases} 0, & x < -2 \\ 2, & -2 \leq x \leq 3 \\ 0, & x > 3 \end{cases}$



4.1

$$\textcircled{4} y = \begin{cases} -x^2 - 2x + 4, & x \leq 1 \\ -x^2 + 6x - 4, & x > 1 \end{cases}$$

$$y' = \begin{cases} -2x - 2, & x \leq 1 \\ -2x + 6, & x > 1 \end{cases}$$

$$-2x - 2 = 0$$

$$-2x = 2$$

$$\underline{x = -1}$$

$$-2x + 6 = 0$$

$$-6 = -6$$

$$-2x = -6$$

$$x = 3$$

$$f(-1) = 5$$

$$f(1) = 1$$

$$f(3) = 5$$

4.1

(25) $y = \frac{1}{\sqrt{1-x^2}} = (1-x^2)^{-1/2}$

$$y' = +\frac{1}{2}(1-x^2)^{-3/2} [+2x]$$

$$= \frac{x}{(1-x^2)^{3/2}} = 0 \quad x=0$$

$$(1-x^2)^{3/2} \neq 0$$

$$1-x^2 \neq 0$$

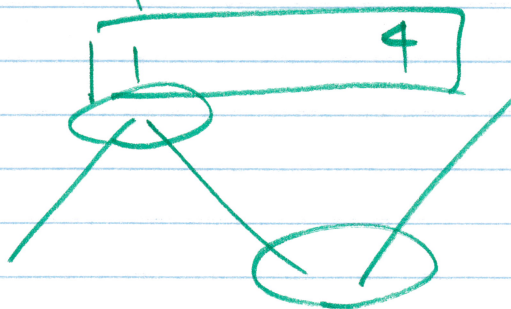
$$1 \neq x^2$$

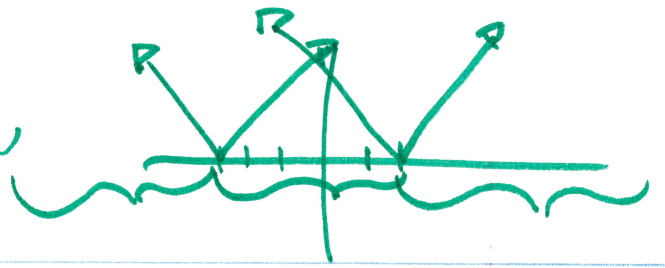
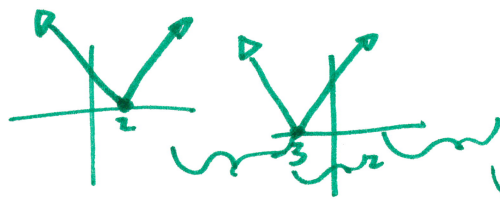
$$\pm 1 \neq x$$

IN 4.3

$$f'(x) = 0 \quad x = 1, 4$$

INCR	DECR	INCR
+	-	+
0	2	5





4.1

$$\textcircled{3} f(x) = |x-2| + |x+3|$$

$$x-2, x > 2$$

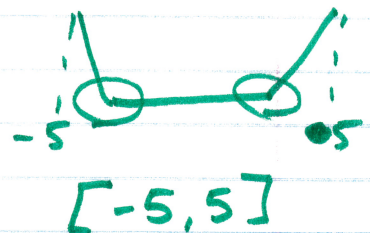
$$-(x-2), x < 2$$

$$f(x) = \begin{cases} -(x-2) + |x+3|, & x < 2 \\ x-2 + |x+3|, & x > 2 \end{cases}$$

$$f(x) = \begin{cases} -(x-2) + -(x+3), & x \leq -3 \\ -(x-2) + (x+3), & -3 < x < 2 \\ (x-2) + (x+3), & x \geq 2 \end{cases}$$

$$f(x) = \begin{cases} ~~x-2~~ -x+2 -x-3, & x \leq -3 \\ -x+2 + x+3, & -3 < x < 2 \\ x-2 + x+3, & x \geq 2 \end{cases}$$

$$f(x) = \begin{cases} -2x-1, & x \leq -3 \\ 5, & -3 < x < 2 \\ 2x+1, & x \geq 2 \end{cases}$$



$$f'(x) = \begin{cases} -2, & x < -3 \\ 0, & -3 < x < 2 \\ 2, & x > 2 \end{cases}$$

$$f(-5) = 9$$

$$f(-3) = 5$$

$$f(2) = 5$$

$$\boxed{f(5) = 11}$$

4.1
⑮ $f(x) = \sin\left(x + \frac{\pi}{4}\right)$, $0 \leq x \leq \frac{7\pi}{4}$

$$f'(x) = \cos\left(x + \frac{\pi}{4}\right) = 0$$

$$x = .785 \text{ish}$$
$$3.926 \text{ish}$$