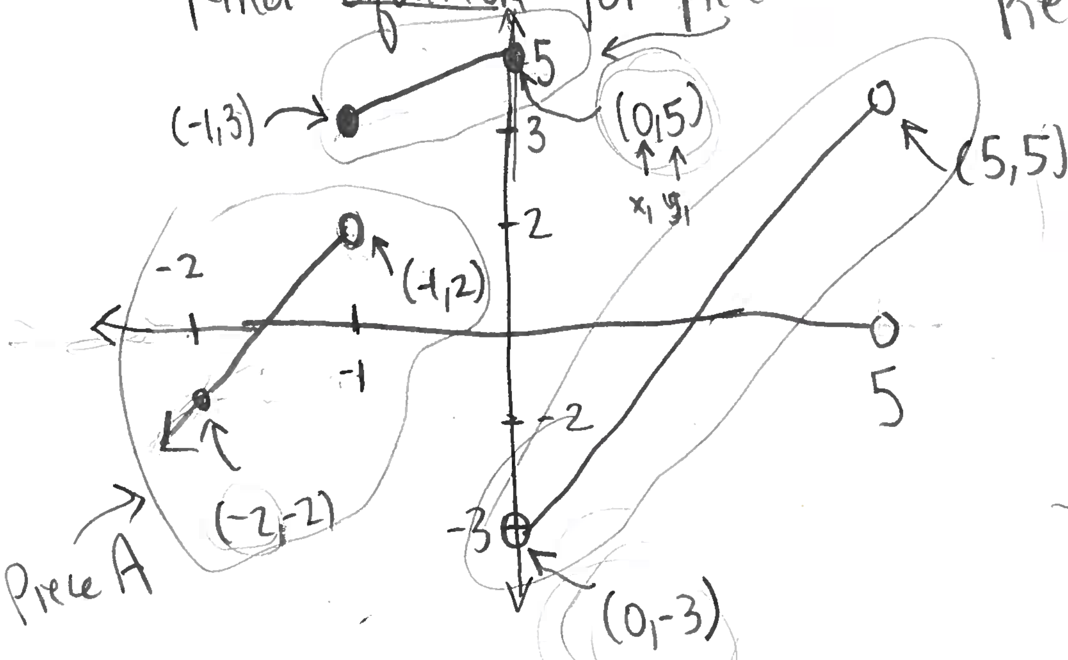
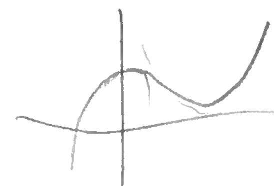
Find ~~equation~~ formula for piece B

Piece C

①



$y = f(x)$



domain: $(-\infty, 5)$ ~ $-\infty < x < 5$

(heights attained) range: $(-\infty, 5]$ ~ $-\infty < x \leq 5$

P-S form

~~$x - x_1$~~

$y - y_1 = m(x - x_1)$

(x_1, y_1) pt on line

m – slope

Piece A

domain: $(-\infty, -1)$ ~ $-\infty < x < -1$

line: slope $= \dfrac{2-(-2)}{-1-(-2)} = \dfrac{4}{1} = 4$

eqt: $y - (-2) = 4(x - (-2))$

$y + 2 = \underbrace{4(x+2)}_{4x+8}$

solve for y

$\boxed{y = 4x + 6}$

Piece B

domain: $[-1, 0]$ ~ $-1 \leq x \leq 0$

slope $= \dfrac{5-3}{0-(-1)} = \dfrac{2}{1} = 2$

$y - 5 = 2(x - 0)$

$y = 2x + 5$

Piece C

domain: $(0, 5)$ ~ $0 < x < 5$

Slope $= \dfrac{5-(-3)}{5-0} = \dfrac{8}{5}$

$y - (-3) = \dfrac{8}{5}(x - 0) \rightarrow \boxed{y = \dfrac{8}{5}x - 3}$

Write as a piecewise function

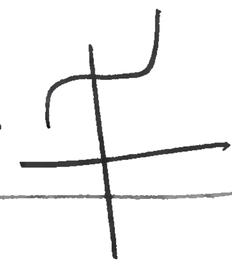
"element of"

$x \in (-\infty, -1)$

$$f(x) = \begin{cases} 4x+6, & -\infty < x < -1 \\ 2x+5, & -1 \leq x \leq 0 \\ \frac{8}{5}x-3, & 0 < x < 5 \end{cases}$$

Transformations

transf →



		Action
vertical shift	$f(x) \pm C$	add or subtract C from y-vals
horizontal shift	$f(x \pm C)$	subtract or add C to x-vals
vertical stretch/comp.	$Cf(x)$	multiply y-vals by C
horizontal stretch/comp.	$f(Cx)$	divide x-vals by C

horiz is twisted

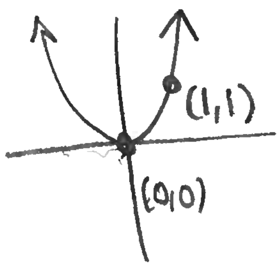
Ex: Plot $y=3(x+2)^2$

vert str by 3
y-vals mult by 3

horiz shift
left by 2
(x-vals subtr 2)

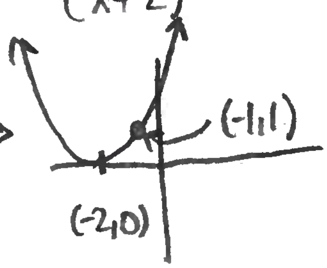
fundamental function

x^2

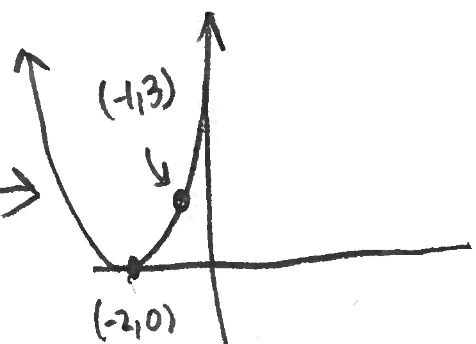


horiz shift

$(x+2)^2$



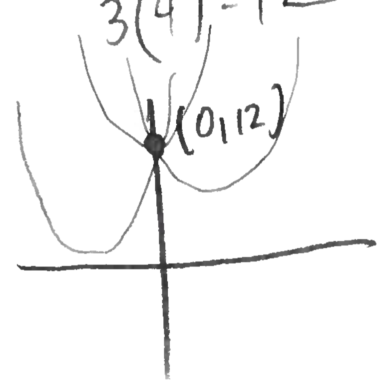
vert str



$3(0+2)^2$

$=$

$3(4)=12$

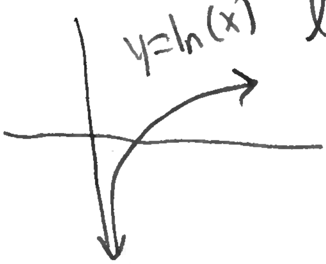


Props of ~~exponentials~~ logs ln log

$\rightarrow \ln(a^b) = b\ln(a)$

$\ln(ab) = \ln(a) + \ln(b)$

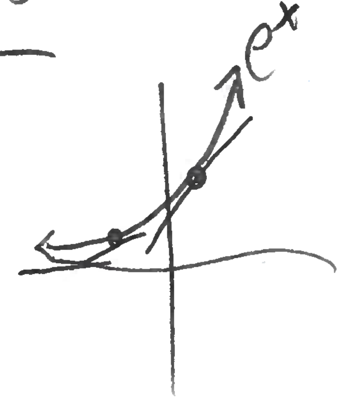
$\ln\left(\frac{a}{b}\right) = \ln(a) - \ln(b)$



Props of ~~logs~~ exp

$e^a e^b = e^{a+b}$

$\frac{e^a}{e^b} = e^{a-b}$



$\cancel{e}^{\cancel{\ln} x} = x$ $\quad \ln(e^x) = x$

Solve: $2^{x+3} = 5$

$\ln(2^{x+3}) = \ln(5)$

$(x+3)\ln(2) = \ln(5)$

$x + 3 = \frac{\ln(5)}{\ln(2)}$

$x = \frac{\ln(5)}{\ln(2)} - 3$

$\ln(\ln(\ln(x))) = 2$

$\cancel{e}^{\cancel{\ln}(\ln(\ln(x)))} = e^2$

$\ln(\ln(x)) = e^2$

$\cancel{e}^{\cancel{\ln}(\ln(x))} = e^{e^2}$

$\ln(x) = e^{e^2}$

$x = e^{e^{e^2}}$