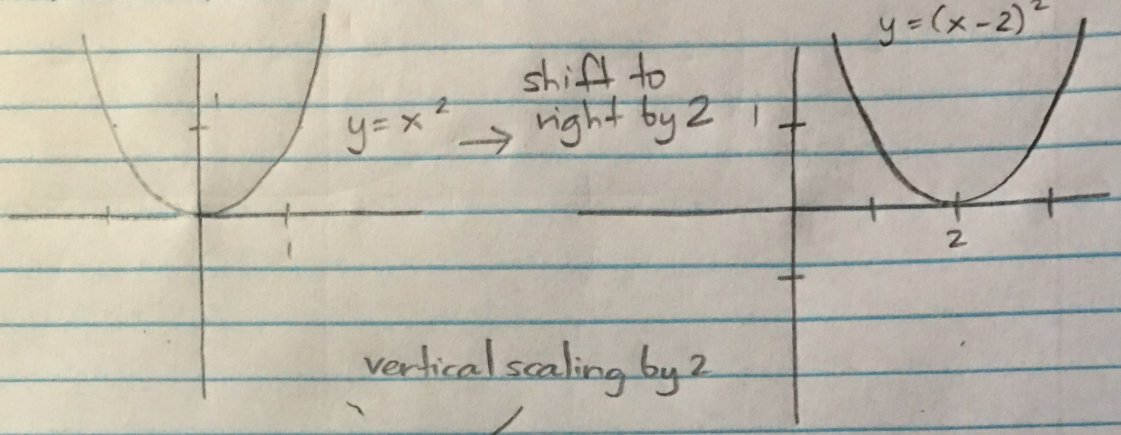
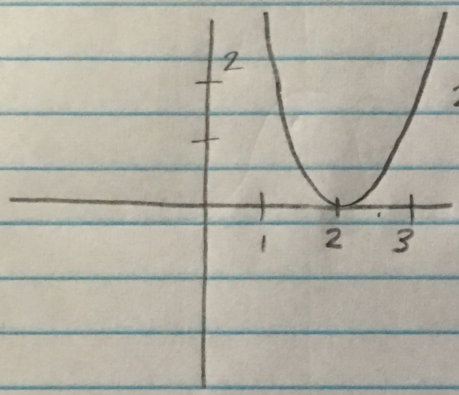
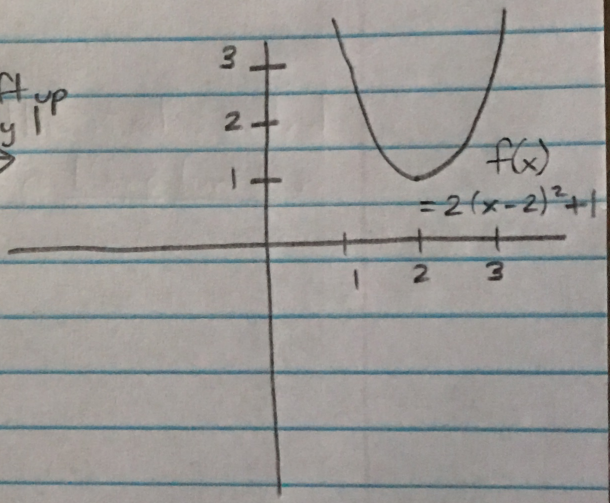
1) (a) $f(x) = 2(x-2)^2 + 1$



vertical scaling by 2

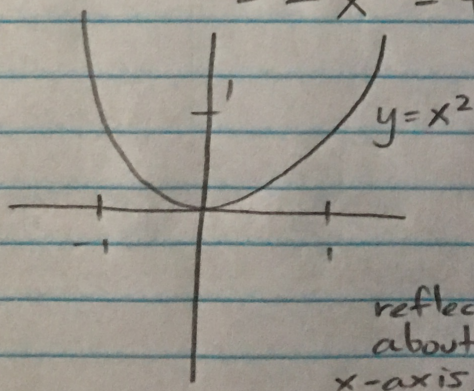


shift up by 1

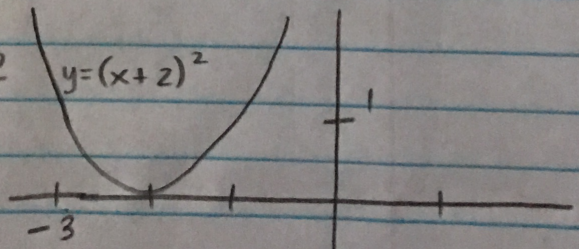


(b) $g(x) = -x^2 - 4x - 2$

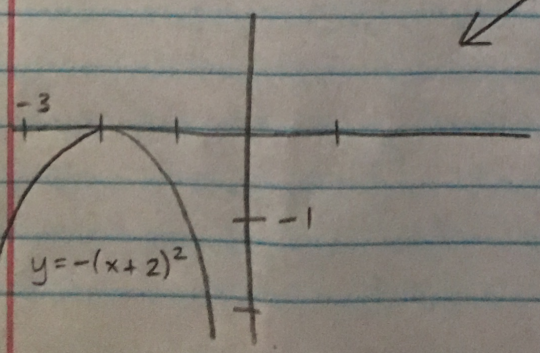
$= -x^2 - 4x - 4 + 2 = -(x+2)^2 + 2$



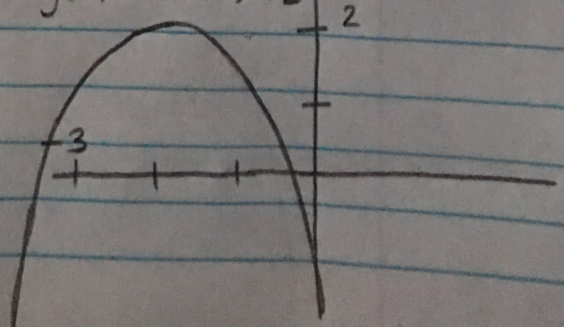
shift to left by 2



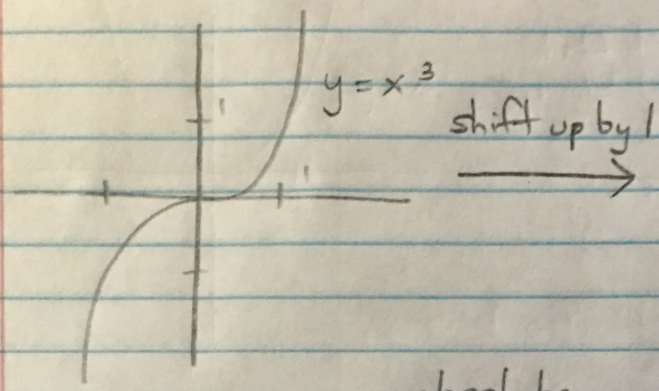
reflect about x-axis

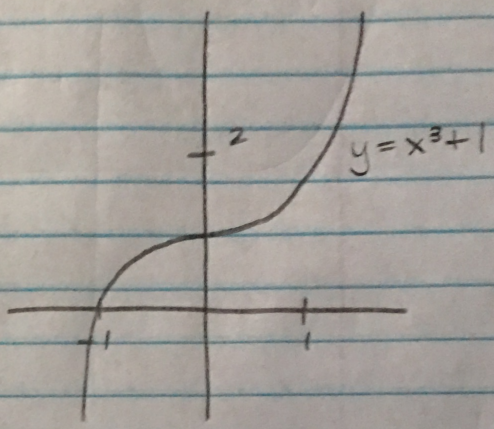


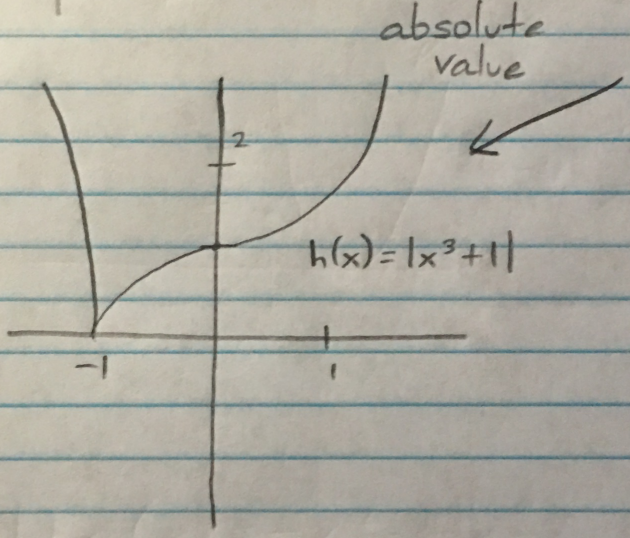
shift up by 2



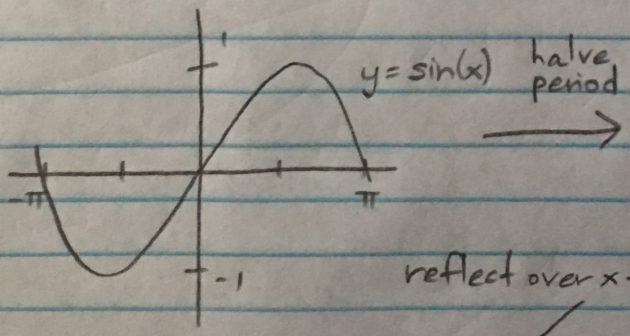
1)(c) $h(x) = |x^3 + 1|$

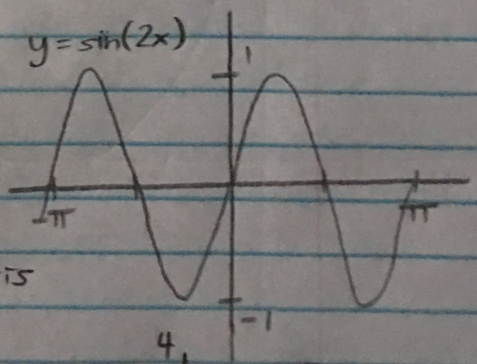


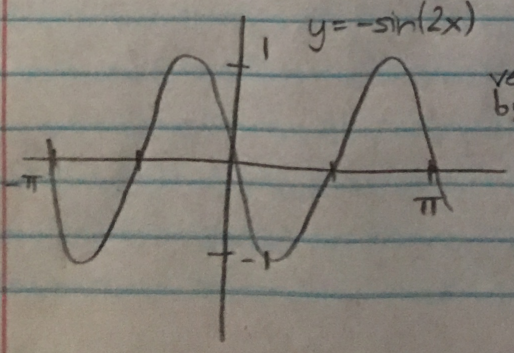


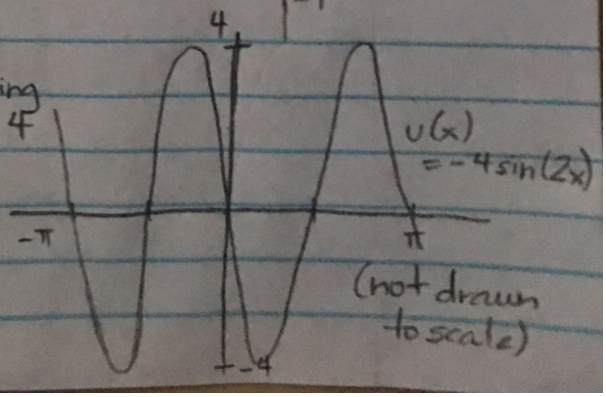


(d) $v(x) = -4\sin(2x)$

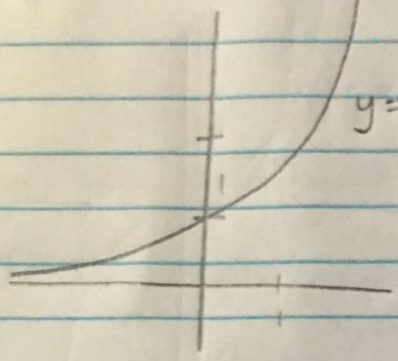




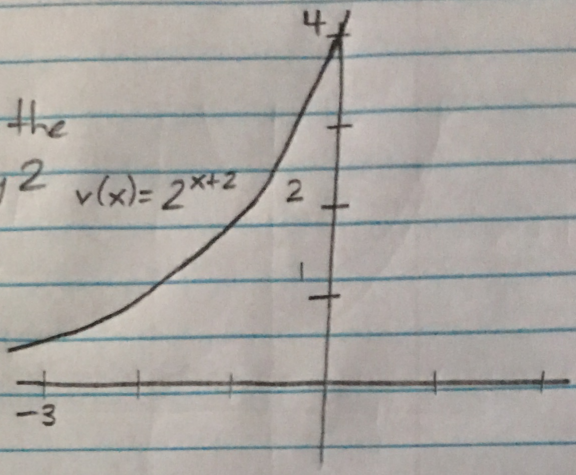




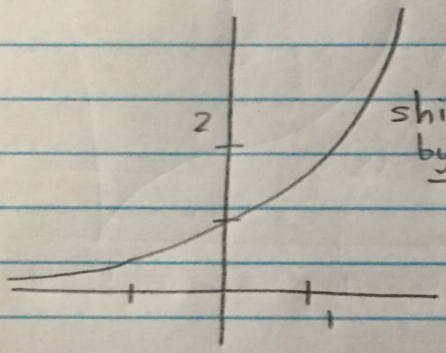
1) (e) $v(x) = 2^{x+2}$



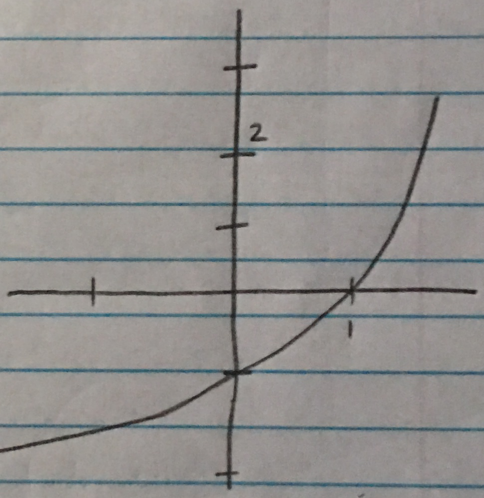
shift to the left by 2 →



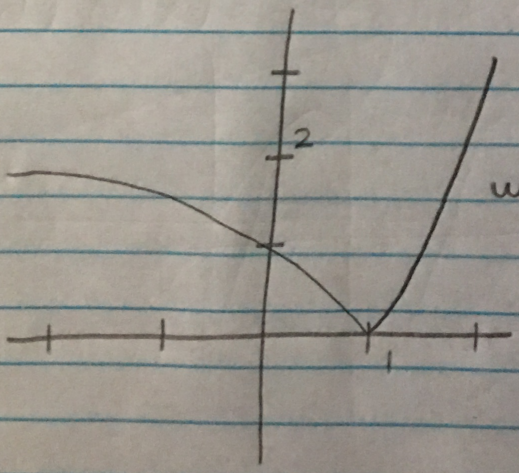
(f) $w(x) = |2^x - 2|$



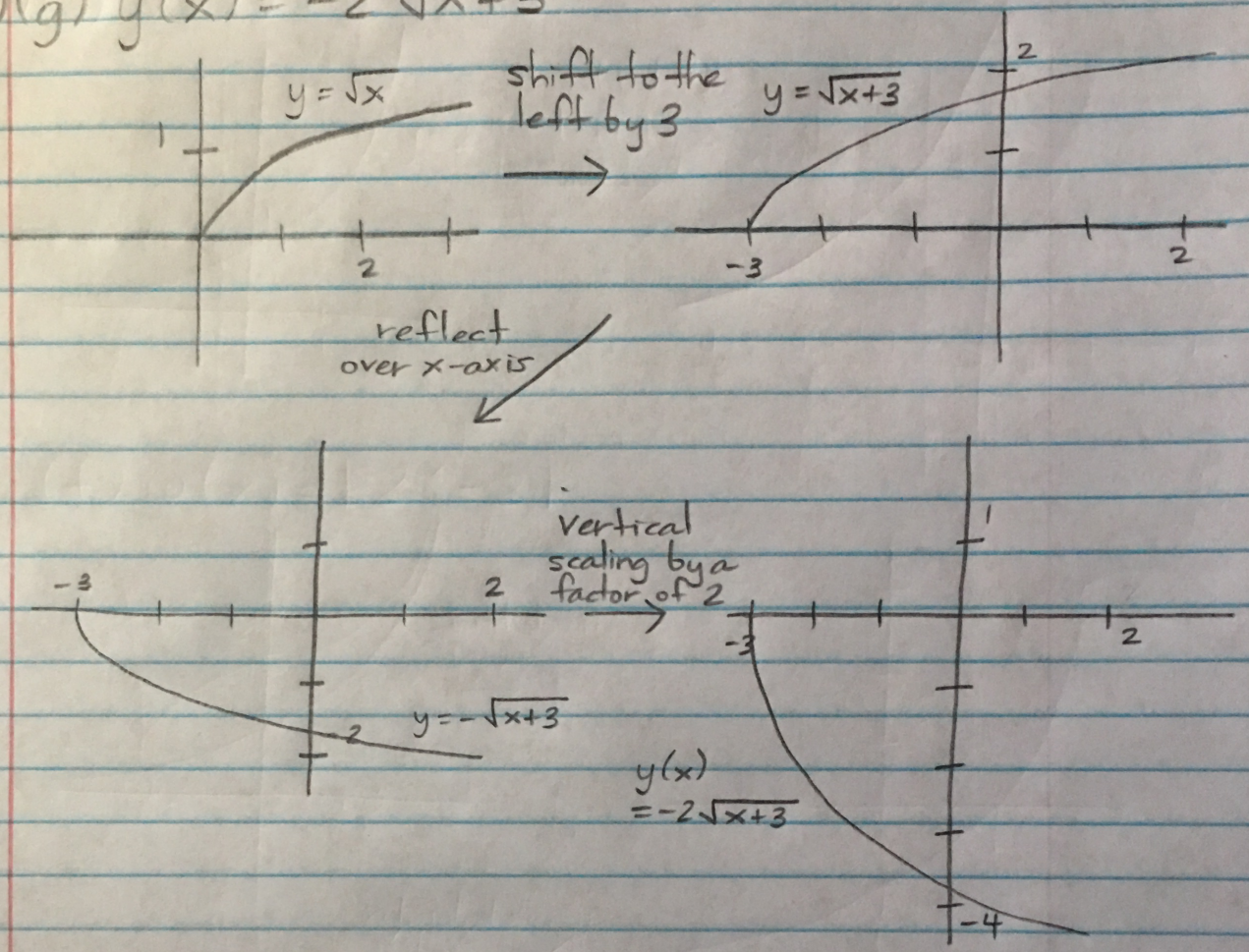
shift down by 2 →



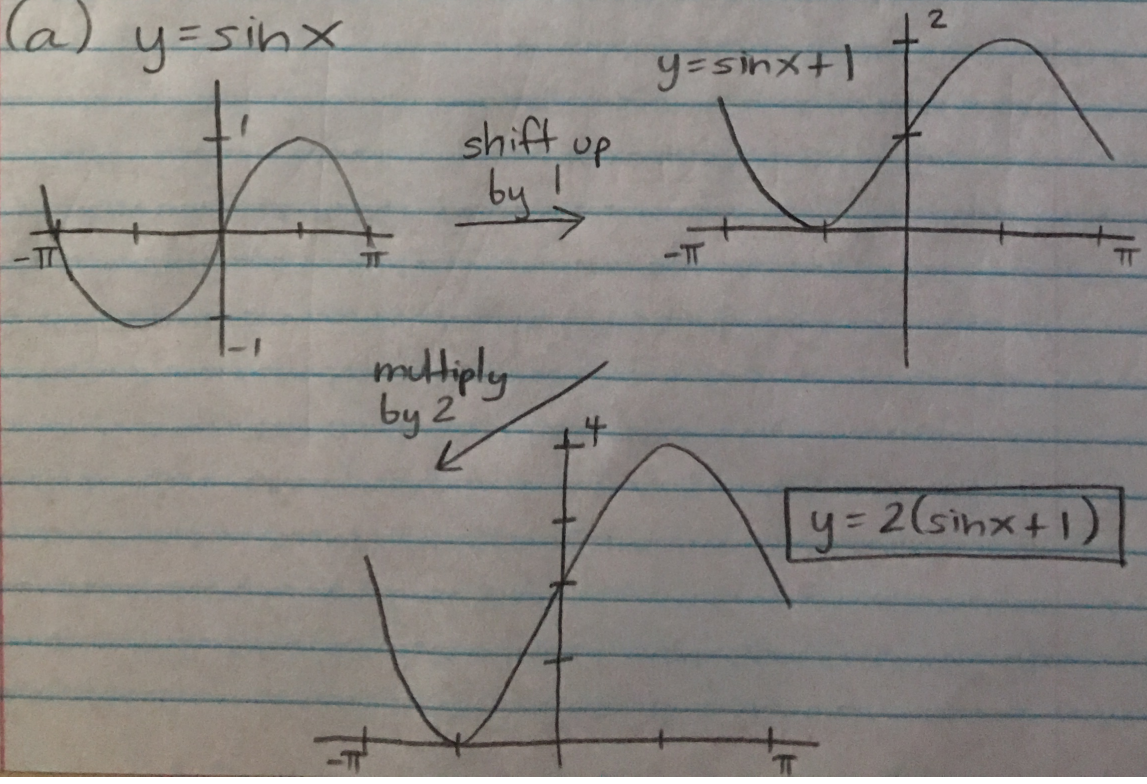
absolute value ↙



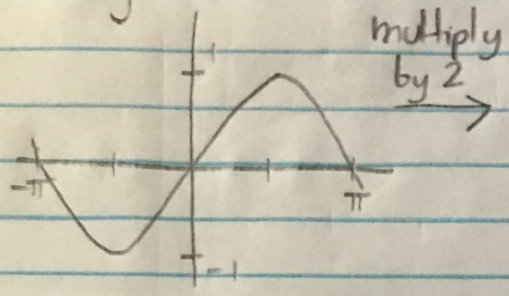
1)(g) $y(x) = -2\sqrt{x+3}$



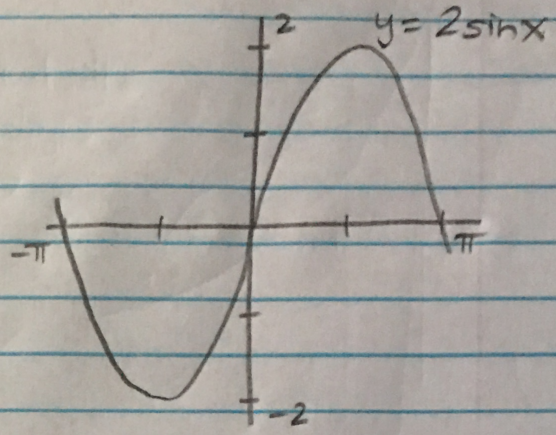
2)(a) $y = \sin x$

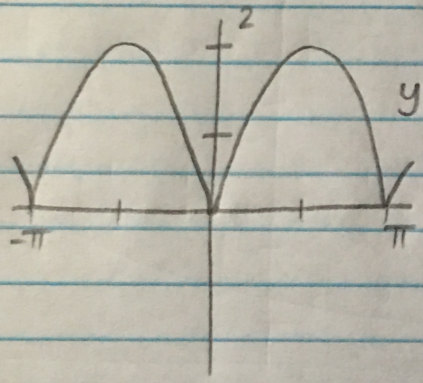


(b) $y = \sin x$



multiply by 2





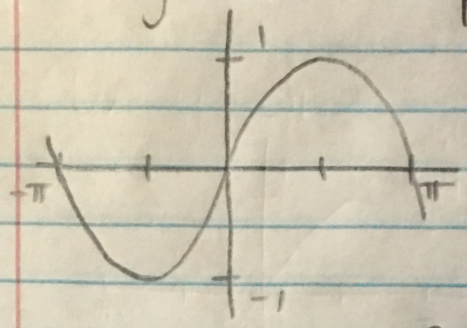
(c) Same as (a) because

$$y = \sin x \xrightarrow{(B)} y = \sin x + 1 \xrightarrow{(D)} y = 2(\sin x + 1)$$

$$y = 2(\sin x + 1) \xrightarrow{(A)} y = |2(\sin x + 1)| = 2(\sin x + 1)$$

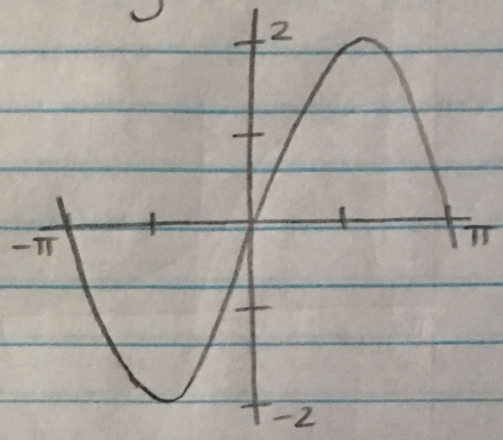
since we see from the graph of $y = 2(\sin x + 1)$ in (a) that $y = 2(\sin x + 1)$ is always ≥ 0.

2) (d) $y = \sin x$

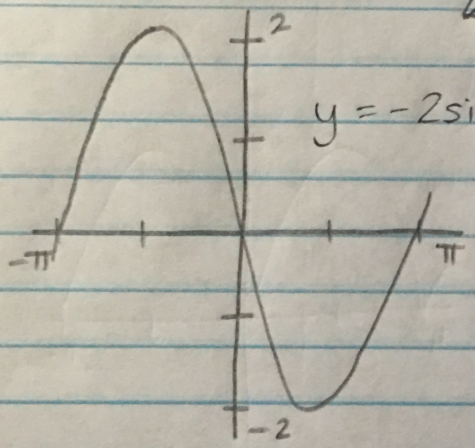


Multiply by 2 →

$y = 2\sin x$

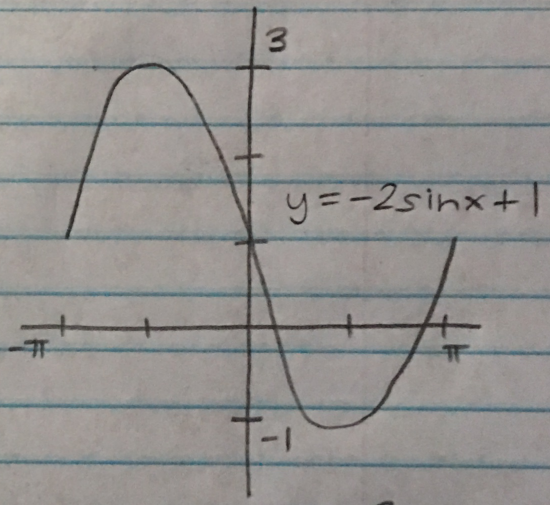


Reflect over x-axis ↓



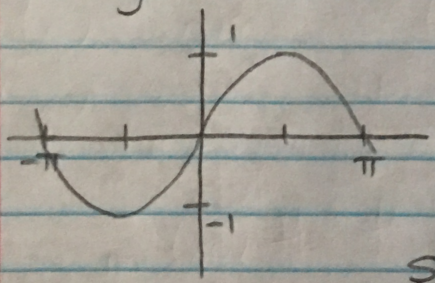
$y = -2\sin x$

Shift up by 1 →

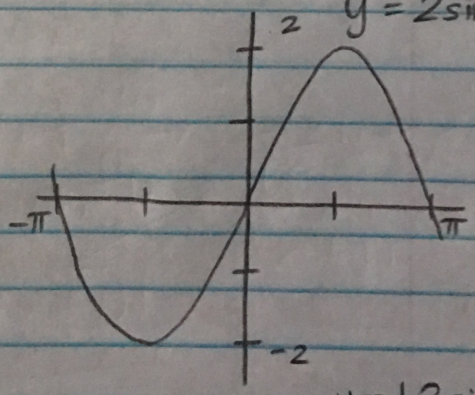


$y = -2\sin x + 1$

(e) $y = \sin x$



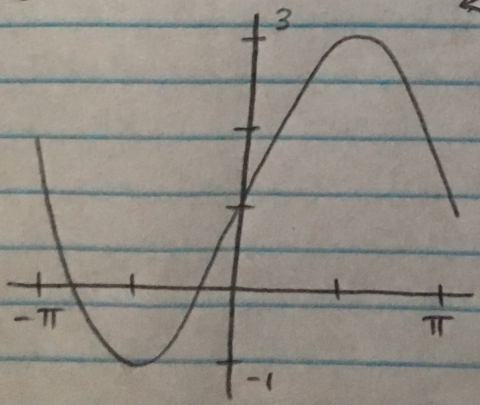
Multiply by 2 →



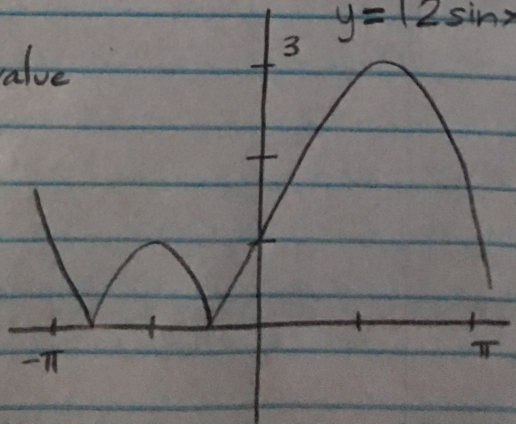
$y = 2\sin x$

Shift up by 1 ↓

$y = 2\sin x + 1$

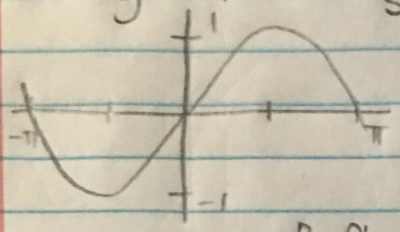


Absolute value →



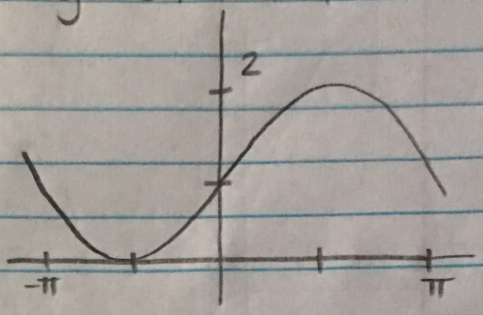
$y = |2\sin x + 1|$

2) (f) $y = \sin x$

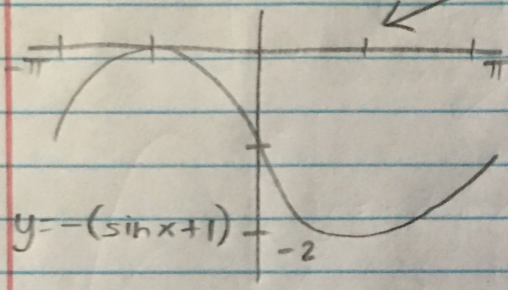


Shift up by 1 →

$y = \sin x + 1$



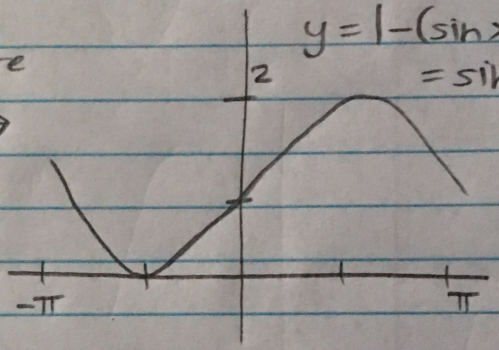
Reflect across x-axis ←



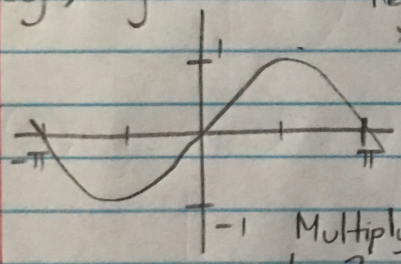
Absolute value →

$y = |-(\sin x + 1)|$

$= \sin x + 1$

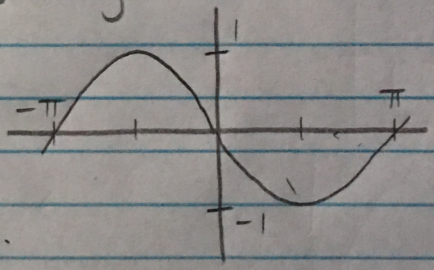


(g) $y = \sin x$

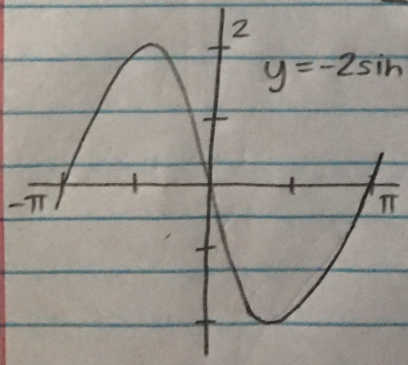


Reflect across x-axis →

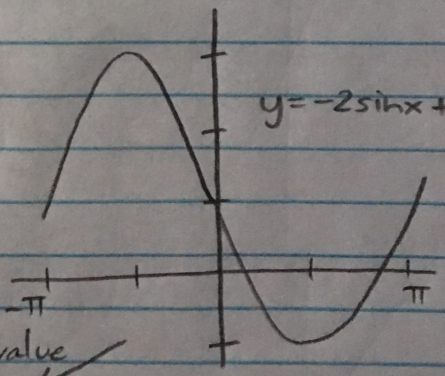
$y = -\sin x$



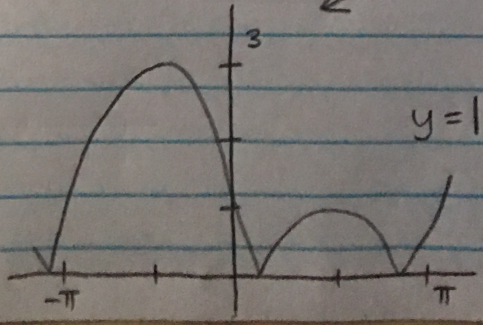
Multiply by 2 ←



Shift up by 1 →



Absolute value ←



$y = |-2\sin x + 1|$