Reflections $\quad y = f(x)$

$y = f(-x)$ is a reflection in y-axis

$y = -f(x)$ is a reflection in x-axis

Translations

$y = f(x-a)$ is a translation by $\begin{pmatrix} a \\ 0 \end{pmatrix}$

$y = f(x) + b$ is a translation by $\begin{pmatrix} 0 \\ b \end{pmatrix}$

The graph $y = f(x)$ has a turning point at $(3, 4)$

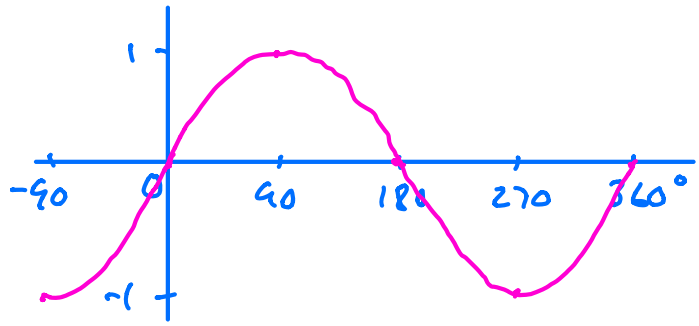
What are the coords of the turning point of $y = -f(x) + 5$

$y = -f(x) \qquad (3, 4) \longrightarrow (3, -4)$

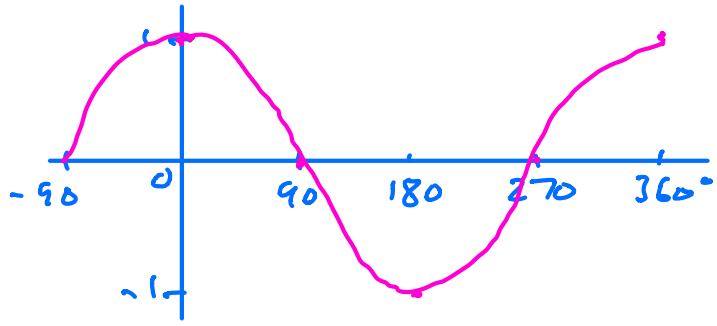
$y = -f(x) + 5 \qquad (3, 4) \longrightarrow (3, 1)$

Graphs of Trigonometric Functions

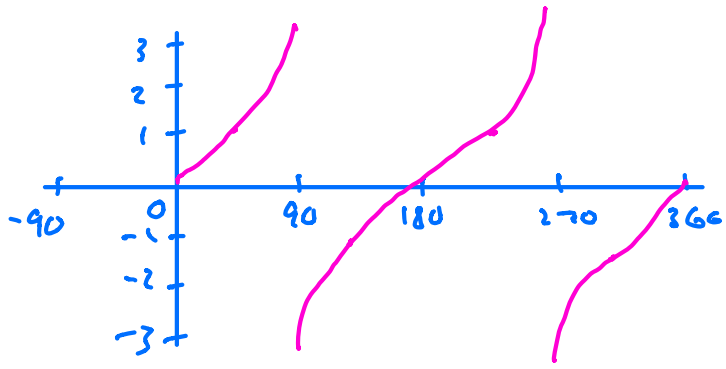
$y = \sin x$



$y = \cos x$



$y = \tan x$



Transformations

1) $y = f(x)$ has the point $A(2, 3)$ on it

Where is the point equivalent to A on

a) $y = f(-x)$ $A(-2, 3)$

b) $y = -f(x)$ $A(2, -3)$

c) $y = f(x-7)$ $A(9, 3)$

d) $y = f(x) + 4$ $A(2, 7)$

e) $y = f(x+1)$ $A(1, 3)$

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f) $y = -f(x) + 6$

$(2, 3) \rightarrow (2, -3) \rightarrow (2, 3)$

g) $y = f(x-5) - 7$

$(2, 3) \rightarrow (7, 3) \rightarrow (7, -4)$

Ex 2 $y = f(x)$ has point $B(4, -2)$

Where is B on the following functions

a) $y = -f(x) + 1$

$(4, -2) \rightarrow (4, 2) \rightarrow (4, 3)$

b) $y = -f(x+8)$

$(4,-2) \rightarrow (-4,-2) \rightarrow (-4, 2)$

c) $y = f(-x) + 6$

$(4,-2) \rightarrow (-4,-2) \rightarrow (-4, 4)$

d) $y = f(x+5) + 3$

$(4,-2) \rightarrow (-1,-2) \rightarrow (-1, 1)$

e) $y = f(x-2) - 2$

$(4,-2) \rightarrow (6,-2) \rightarrow (6,-4)$

Ex 3 $y = g(x)$ has point $C(5,0)$

where does C go?

a) $y = -g(x) + 4$ $(5,0) \rightarrow (5,0) \rightarrow (5,4)$

b) $y = g(x-3) - 1$ $(5,0) \rightarrow (8,0) \rightarrow (8,-1)$

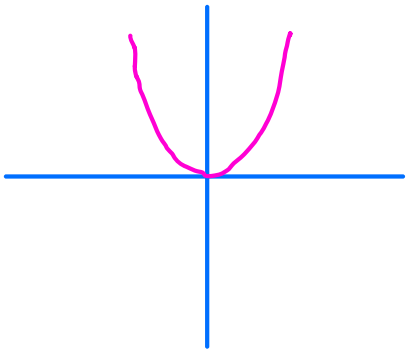
c) $y = g(-x) - 3$ $(5,0) \rightarrow (-5,0) \rightarrow (-5,-3)$

d) $y = -g(x+2)$ $(5,0) \rightarrow (3,0) \rightarrow (3,0)$

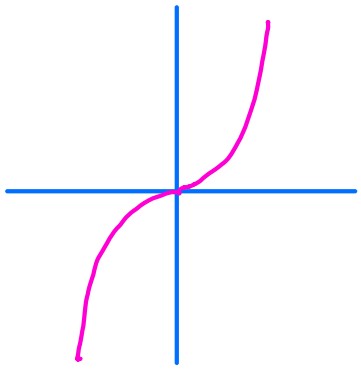
e) $y = -g(x-1)$ $(5,0) \rightarrow (6,0) \rightarrow (6,0)$

Other graphs

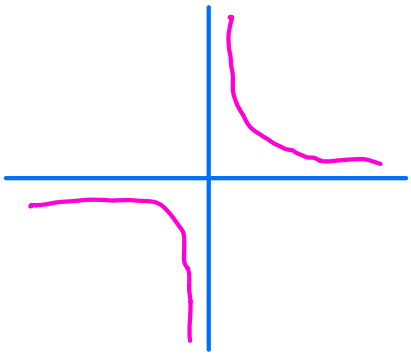
$y = x^2$



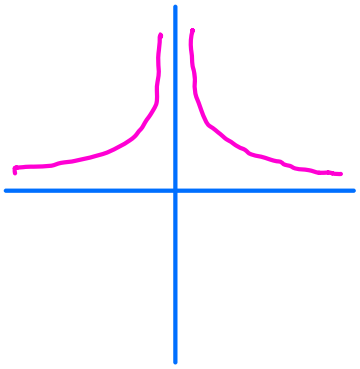
$y = x^3$



$y = \frac{1}{x}$



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



$y = 2^x$