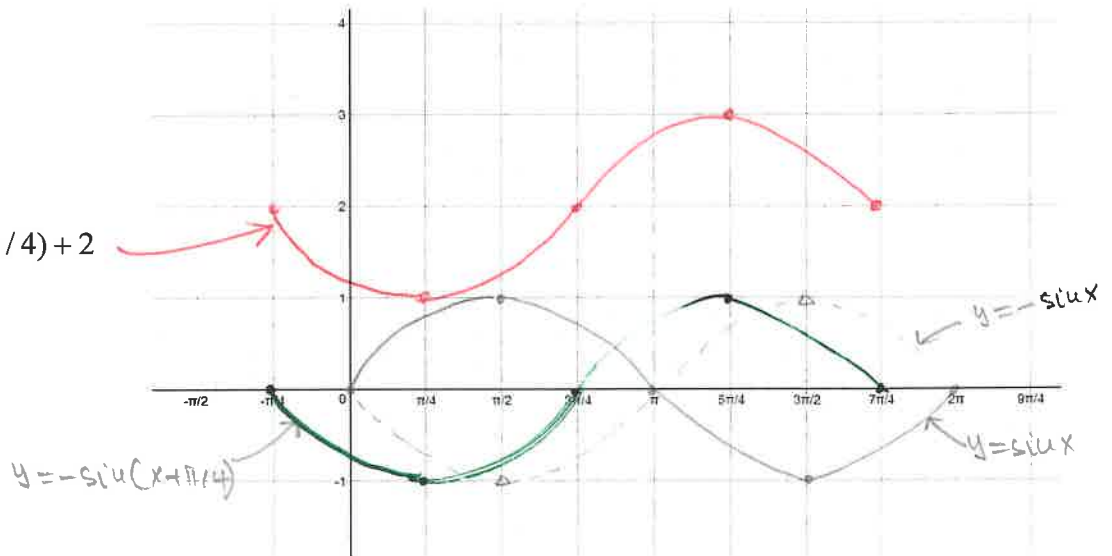


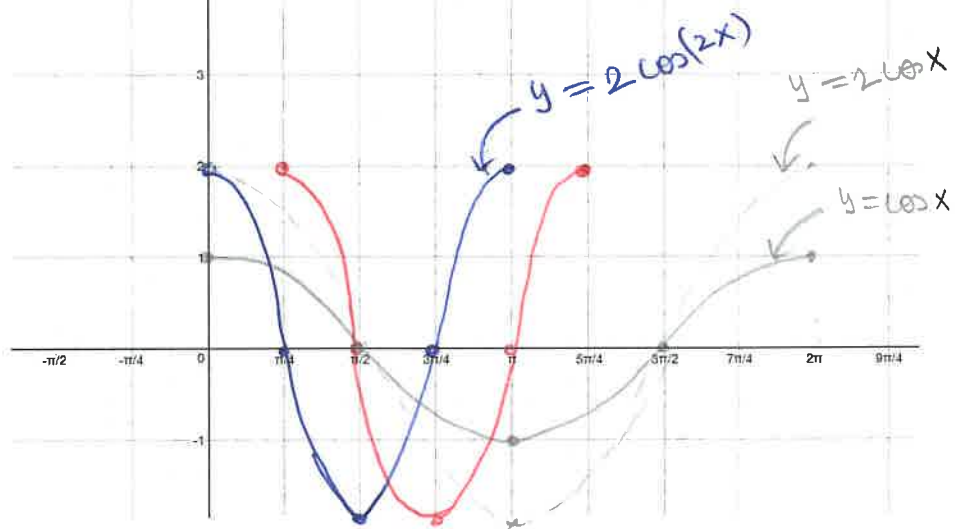
**MHF4U**  
Trigonometric Functions

1. Graph by using transformations.

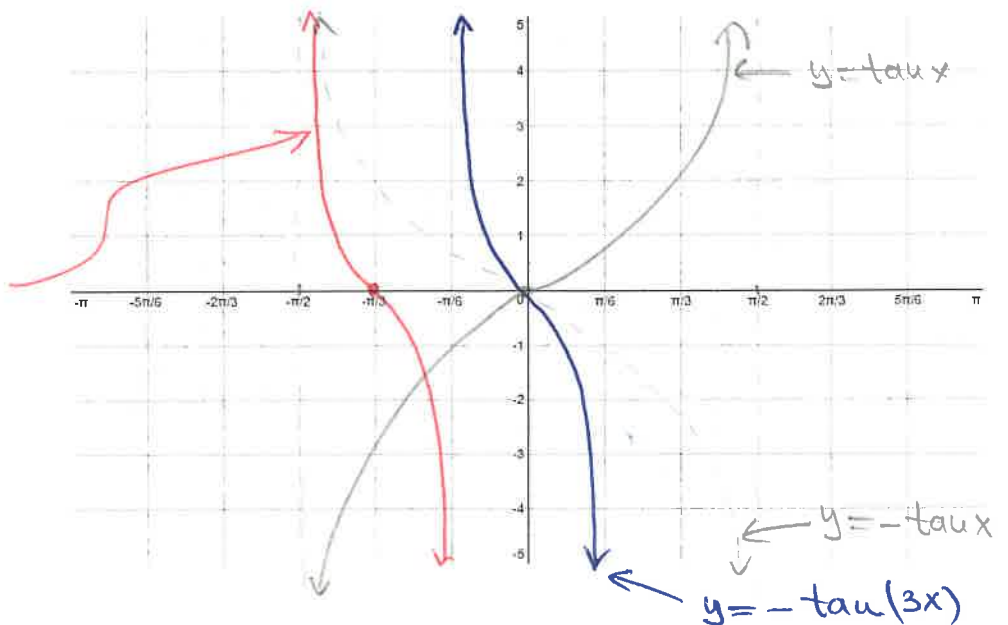
a)  $y = -\sin(x + \pi/4) + 2$



b)  $y = 2\cos\left(\frac{\pi}{2} - 2x\right)$   
 $= 2\cos\left[-2\left(x - \frac{\pi}{4}\right)\right]$   
 $= 2\cos\left[2\left(x - \frac{\pi}{4}\right)\right]$



c)  $y = -\tan(3x + \pi)$   
 $= -\tan\left[3\left(x + \frac{\pi}{3}\right)\right]$



2. Describe the transformations involved.

$$y = -4 \sin\left(\frac{\pi}{2} - 3x\right) + 5$$

$$= -4 \sin\left[-3\left(x - \frac{\pi}{6}\right)\right] + 5$$

- reflection in the x-axis
- vertical expansion by a factor of 4
- reflection in the y-axis
- horizontal compression by a factor of  $\frac{1}{3}$
- horizontal shift to the right by  $\frac{\pi}{6}$
- vertical shift upward by 5

3. Write the equation of the trigonometric function  $y = \cos x$  after the following transformations:

- Reflection in the x-axis
- Vertical compression by 0.5
- Reflection in the y-axis
- Horizontal expansion by 3
- Horizontal shift to the left by  $\pi/2$
- Vertical shift down by 4

$$y = -\frac{1}{2} \cos\left[-\frac{1}{3}\left(x + \frac{\pi}{2}\right)\right] - 4$$

4. Graph the following function by using a method at your convenience.

$$y = -3 \cos\left(\frac{\pi}{2} - 3x\right) + 2$$

$$A = 3$$

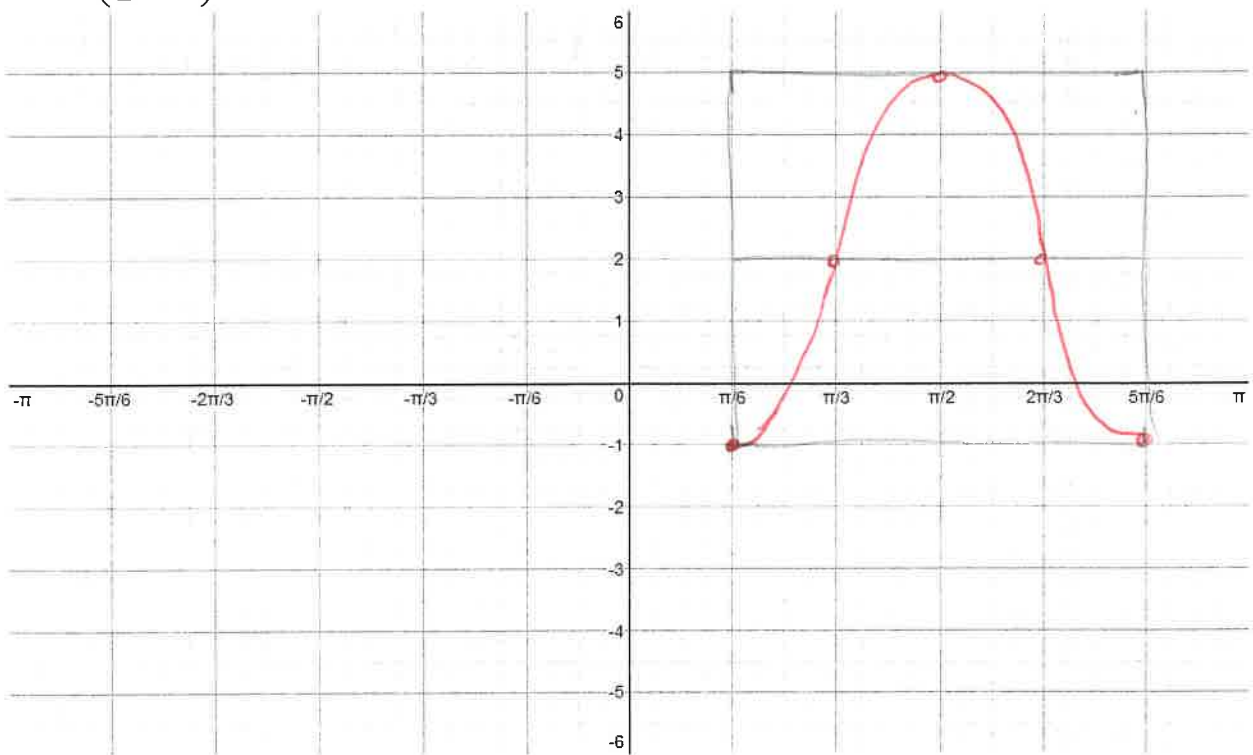
$$y_{\max} = 5$$

$$T = \frac{2\pi}{3}$$

$$y_{\text{axis}} = 2$$

$$y_{\min} = -1$$

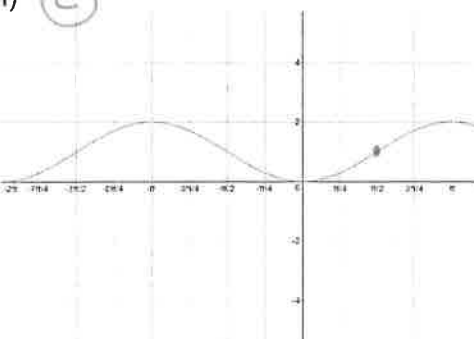
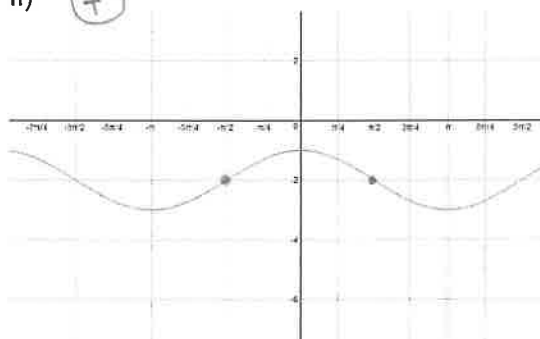
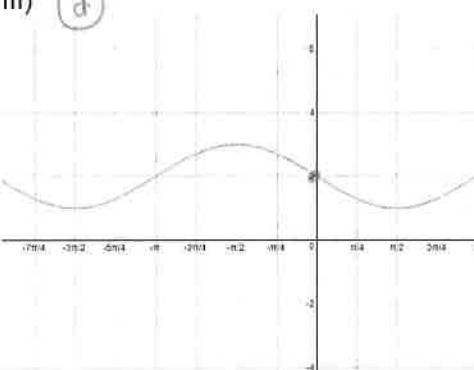
$$PS = \pi/6$$



$$y = -3 \cos\left[-3\left(x - \frac{\pi}{6}\right)\right] + 2$$

$$PS + T = \frac{\pi}{6} + \frac{2\pi}{3} = \frac{5\pi}{6}$$

5. Match the equations on the left to the graphs on the right. Some equations may not have a corresponding graph.

<p>a) <math>y = -\sin(x + \pi/2) - 1</math> <span style="float: right;">IV</span></p> <p>b) <math>y = -\sin(x + \pi/2)</math> <span style="float: right;">X</span></p> <p>c) <math>y = \sin(x - \pi/2) + 1</math> <span style="float: right;">I</span></p> <p>d) <math>y = -\sin x + 2</math> <span style="float: right;">III</span></p> <p>e) <math>y = -\sin x - 2</math> <span style="float: right;">X</span></p> <p>f) <math>y = \sin(x + \pi/2) - 2</math> <span style="float: right;">II</span></p>	<p>I) <span style="float: right;">C</span></p> 	<p>II) <span style="float: right;">f</span></p> 
	<p>III) <span style="float: right;">d</span></p> 	<p>IV) <span style="float: right;">a</span></p> 