

Describe any phase shift and vertical shift each equation represents.

1.  $y = 4\sin(x + \pi) - 1$

2.  $y = -9\cos(5(x - \frac{2\pi}{3})) + 6$

Write the equation of each using the description of the transformations applied to each parent function.

3. Parent function:  $\cos x$     Transformations: Upside-down, Period =  $\frac{2\pi}{7}$ , shift  $\frac{\pi}{4}$  to the left & 10 units up.

EQ:

4. Parent function:  $\sin x$     Transformations: Vertical stretch factor of 4, Period =  $6\pi$ , shift  $\frac{3\pi}{4}$  to the right and 9 units down.

EQ:

3. Find the period, amplitude, phase shift, and equation of the midline for this function:

$$y = 11\cos(12(x - \frac{5\pi}{4})) + 13$$

For 4 and 5, graph one period of each function. Label the coordinates of the maximums, minimums, and x-intercepts.

4.  $y = -5\sin(2(x + \frac{\pi}{2})) + 8$

5.  $y = 8\cos(3(x - \frac{\pi}{6})) - 5$

For 6 and 7. Write both a Sin and Cos equation for the graph below.

