

Trig Graphing – WS 5

Name Key

Sine and Cosine Graphs with all Transformations

State the amplitude, period, phase shift and vertical shift of each of the following functions. Then graph one complete period of each function, labeling the horizontal axis and vertical axis. Also state the domain and range of one period using interval notation. ** Remember: $\theta \rightarrow$ degrees and $x \rightarrow$ radians. **

1) $y = \cos(2x + \pi)$

$A=1$
 $Pd = \frac{2\pi}{2} = \pi$
 $PS = -\frac{\pi}{2}$
 $VS = NA$
 $D = [-\pi/2, \pi/2]$
 $R = [-1, 1]$

$2x + \pi = 0 \quad 2x + \pi = 2\pi$
 $2x = -\pi \quad 2x = \pi$
 $x = -\frac{\pi}{2} \quad x = \frac{\pi}{2}$

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

$A=1$
 $Pd = \frac{2\pi}{3}$
 $PS = \frac{\pi}{6}$
 $VS = NA$
 $D = [\pi/6, 5\pi/6]$
 $R = [-1, 1]$

$3x - \frac{\pi}{2} = 0$
 $3x = \frac{\pi}{2}$
 $x = \frac{\pi}{6}$

$3x - \frac{\pi}{2} = 2\pi$
 $3x = \frac{5\pi}{2}$
 $x = \frac{5\pi}{6}$

3) $y = -\frac{1}{2} \sin\left(\frac{1}{2}x + \frac{\pi}{2}\right)$

$A = \frac{1}{2}$
 $Pd = \frac{2\pi}{1/2} = 4\pi$
 $PS = -\pi$
 $VS = NA$
 $D = [-\pi, 3\pi]$
 $R = [-1/2, 1/2]$

$\frac{1}{2}x + \frac{\pi}{2} = 0 \quad \frac{1}{2}x + \frac{\pi}{2} = 2\pi$
 $\frac{1}{2}x = -\frac{\pi}{2} \quad \frac{1}{2}x = \frac{3\pi}{2}$
 $x = -\pi \quad x = 3\pi$

4) $y = -\sin(-x - \pi) - 3$

$A=1$
 $Pd = 2\pi$
 $PS = -\pi$
 $VS = -3$
 $D = [-\pi, \pi]$
 $R = [-4, -2]$

$y = -\sin(-(x + \pi)) - 3$
 $y = \sin(x + \pi) - 3$

$x + \pi = 0 \quad x + \pi = 2\pi$
 $x = -\pi \quad x = \pi$

5) $y = 3 \sin(-2x) + 2$

$A=3$
 $Pd = \frac{2\pi}{2} = \pi$
 $PS = NA$
 $VS = 2$
 $D = [0, \pi]$
 $R = [-1, 5]$

$2x = 0 \quad 2x = 2\pi$
 $x = 0 \quad x = \pi$

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

$A=1$
 $Pd = \frac{2\pi}{3}$
 $PS = \pi/6$
 $VS = NA$
 $D = [\pi/6, 5\pi/6]$
 $R = [-1, 1]$

7) $y = 2 \cos(4x + \pi) + 1$

$A=2$
 $Pd = \frac{2\pi}{4} = \frac{\pi}{2}$
 $PS = -\pi/4$
 $VS = 1$
 $D = [-\pi/4, \pi/4]$
 $R = [-1, 3]$

$4x + \pi = 0 \quad 4x + \pi = 2\pi$
 $4x = -\pi \quad 4x = \pi$
 $x = -\pi/4 \quad x = \pi/4$

8) $y = 3 \cos x + 1$

$A=3$
 $Pd = 2\pi$
 $PS = NA$
 $VS = 1$
 $D = [0, 2\pi]$
 $R = [-2, 4]$

9) $y = 2 \sin(4x + \pi) - 1$

$A=2$
 $Pd = \frac{2\pi}{4} = \frac{\pi}{2}$
 $PS = -\pi/4$
 $VS = -1$
 $D = [-\pi/4, \pi/4]$
 $R = [-3, 1]$

$4x + \pi = 0 \quad 4x + \pi = 2\pi$
 $4x = -\pi \quad 4x = \pi$
 $x = -\pi/4 \quad x = \pi/4$

10) $y = \frac{1}{2} \cos(8x - 4\pi) + 1$

$A = \frac{1}{2}$
 $Pd = \frac{2\pi}{8} = \frac{\pi}{4}$
 $PS = \frac{\pi}{2}$
 $VS = 1$
 $D = [\pi/2, 3\pi/4]$
 $R = [1/2, 3/2]$

$8x - 4\pi = 0 \quad 8x - 4\pi = 2\pi$
 $8x = 4\pi \quad 8x = 6\pi$
 $x = \pi/2 \quad x = 3\pi/4$