Transformations of Trigonometric Functions

1. Sketch at least 1 cycle of the graph of the function $f(x) = -2\sec\left[2\left(x-\frac{\pi}{3}\right)\right]-1$ and state all the features of the graph.

First sketch $g(x) = -2\cos\left[2\left(x-\frac{\pi}{3}\right)\right]-1$

features of cos → g(x) *start at min.

Amplitude: 2

Equation of Axis: $y=-1$

Maximum Value: $y=1$

Minimum Value: $y=-3$

Period: $\frac{2\pi}{2} = \pi$

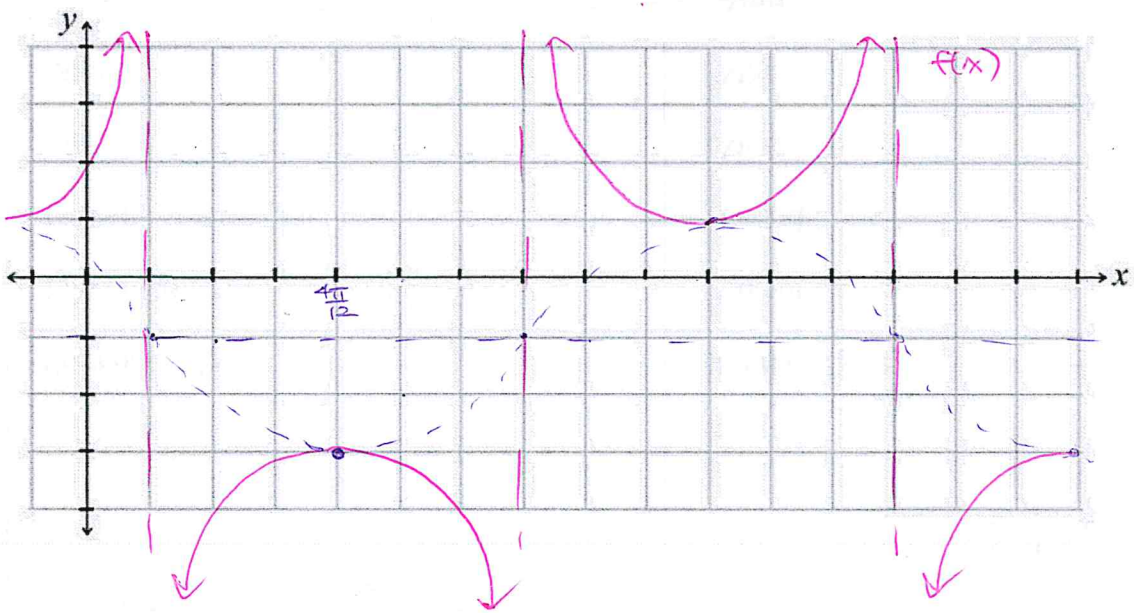
Start of Cycle: $\left(\frac{\pi}{3}, -3\right)$

End of Cycle: $\left(\frac{4\pi}{3}, -3\right)$

end $= \frac{\pi}{3}+\pi$

$= \frac{\pi}{3}+\frac{3\pi}{3}$

$= \frac{4\pi}{3}$



dbp: $\pi \times \frac{1}{4}$

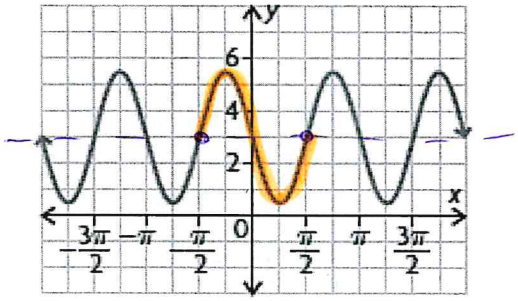
$= \frac{\pi}{4}$

$= \frac{3\pi}{12}$ ← common denominator

phase shift $= \frac{\pi}{3}$

$= \frac{4\pi}{12}$

State the transformations of the following sinusoidal function and determine an equation to represent the graph.



* choose sine *

Start of Cycle: $(-\frac{\pi}{2}, 3)$

End of Cycle: $(\frac{\pi}{2}, 3)$

Period: π $k = \frac{2\pi}{p} = \frac{2\pi}{\pi} = 2$

Max: $y = 5.5$

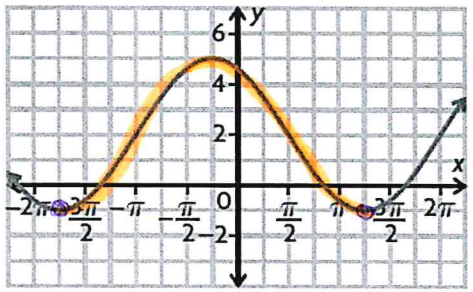
Min: $y = 0.5$

Amplitude: 2.5 or $\frac{5}{2}$

Equation of Axis: $y = 3$

Equation:

$f(x) = \frac{5}{2}\sin\left[2\left(x + \frac{\pi}{2}\right)\right] + 3$



* choose cosine

Start of Cycle: $(-\frac{7\pi}{4}, -1)$ start at min.

End of Cycle: $(\frac{5\pi}{4}, -1)$

Period: 3π $k = \frac{2\pi}{3\pi} = \frac{2}{3}$

Max: $y = 5$

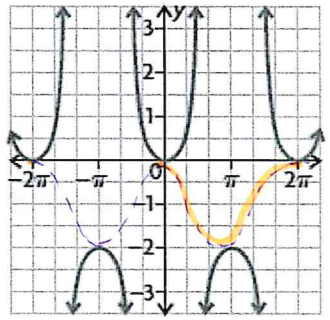
Min: $y = -1$

Amplitude: 3.

Equation of Axis: $y = 2$

Equation:

$f(x) = -3\cos\left[\frac{2}{3}\left(x + \frac{7\pi}{4}\right)\right] + 2$



* choose cosine $\Rightarrow$ secant

For cosine

Start of Cycle: $(0, 0)$

End of Cycle: $(2\pi, 0)$

Period: 2π $k = \frac{2\pi}{2\pi} = 1$

Max: 0

Min: -2

Amplitude: 1

Equation of Axis: $y = -1$

Equation:

$f(x) = \sec x - 1$