

1 (10 pts). Sketch one cycle of the graph of $y = 2 + 3 \sin\left(2x + \frac{3\pi}{4}\right)$. Your drawing should include one cycle of the curve. Draw the axes where you wish and label hashmarks so as to clearly indicate every point in our cycle where the sine equals 0, 1, or -1 .

1. (Source: 4.3.more.1.gp) The function $y = 2 + 3 \sin\left(2x + \frac{3\pi}{4}\right)$ will go through one cycle when the angle inside the sine goes from 0 to 2π .

$$\begin{aligned} 0 \leq 2x + \frac{3\pi}{4} \leq 2\pi & & -\frac{1}{2} \cdot \frac{3\pi}{4} \leq x \leq \frac{1}{2} \cdot \frac{5\pi}{4} \\ -\frac{3\pi}{4} \leq 2x \leq 2\pi - \frac{3\pi}{4} = \frac{5\pi}{4} & & -\frac{3\pi}{8} \leq x \leq \frac{5\pi}{8} \end{aligned}$$

So, our cycle of the cosine will start at $x = -\frac{3\pi}{8}$ and end at $x = \frac{5\pi}{8}$.

The coefficient 3 stretches the sine curve by a factor of 3. The 2 shifts the curve up two units, so that the new centerline of the curve is $y = 2$. The minimum value of y is -1 , and the maximum value is 5.

