5.4 - Graphs of Sine and Cosine

Review Problems

1. Simplify the following:
   \( \frac{3}{\pi} \div \frac{9}{2} \)  \( \frac{2\pi}{5} \div \frac{1}{4} \)

2. Use transformations of graphs (translation, reflection, stretch, compression) to sketch the graphs of the following:
   \( y = -(x - 3)^2 + 8 \)  \( y = 3\sqrt{-x} + 2 - 5 \)

3. Evaluate the following:
   \( \cos \left( \frac{4\pi}{3} \right) \)  \( \sin \left( -\frac{3\pi}{2} \right) \)  \( \cos(5\pi) \)

Basic Knowledge

1. Sketch the graph of each given equation over the interval \([-2\pi, 2\pi]\).
   \( y = 3\sin \left( 2 \left( x - \frac{\pi}{3} \right) \right) \)  \( y = -5\cos \left( \frac{1}{3} (x + \pi) \right) \)
   \( y = 2\cos(3x) + \frac{\pi}{2} \)  \( y = -\sin \left( 4x + \frac{\pi}{2} \right) \)

2. The number of deer in a region is given by \( D(t) = 450\sin \left( \frac{\pi t}{5} \right) + 1200 \), where \( t \) is in years.
   (a) Sketch the graph of function \( D \)
   (b) What are the largest and smallest numbers of deer present in the region at any time?
   (c) How much time elapses between occurrences of the largest and the smallest deer population?

Intermediate Knowledge

1. Sketch each graph over the interval \([-2\pi, 2\pi]\):
   \( y = 2\sin \left( \frac{4}{7}x + \frac{2}{5} \right) + \pi \)  \( y = -\cos \left( \frac{2}{3}x - 1 \right) \)

Advanced Knowledge

1. Sketch each graph over the interval \([-2\pi, 2\pi]\):
   \( y = \left| 5\cos \left( \frac{3}{\pi}x + 2 \right) + 1 \right| \)  \( y = \sqrt{3}\sin \left( \sqrt{6}x + 4\sqrt{2} \right) - 2 \)

2. Find an equation of a sine function from the given graph:
3. Write an equation of the form $y = a \cos(b(x - c))$ that has the same graph as $y = 3 \sin \left[ 2 \left( x - \frac{\pi}{4} \right) \right]$