Int 3MA C9 Review Name Key Per ___ Group ___

1. State the amplitude, period, phase shift and vertical shift for the following. DON'T GRAPH.

a) $5 - y = -4\sin 4\left(x - \frac{\pi}{2}\right)$ → $-y = -4\sin 4\left(x-\frac{\pi}{2}\right) - 5$ → $y = 4\sin 4\left(x-\frac{\pi}{2}\right)+5$

Amp: 4 Phase Shift: $\frac{\pi}{2}$ Period: $\frac{2\pi}{4}$ Vertical Shift: 5

b) $\frac{1}{5}y = \cot 3x$ → $y = 5\cot 3x$

Amp: NONE Phase Shift: 0 Period: $\frac{\pi}{3}$ Vertical Shift: 0

2. Write equations for the function with the following information

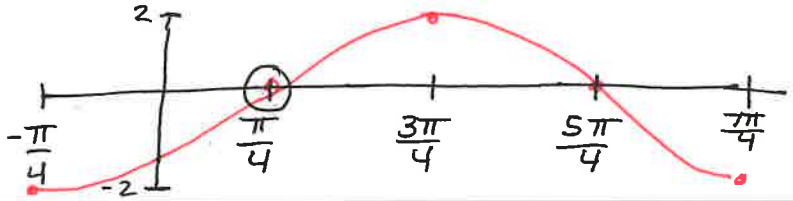
a) Cosine with Amplitude = $\frac{7}{3}$, Period = $\frac{3\pi}{2}$, phase shift = $-\frac{\pi}{4}$ (to the left), and vertical shift = $-\frac{3}{4}$

$y = \frac{7}{3}\cos\frac{4}{3}\left(x+\frac{\pi}{4}\right) - \frac{3}{4}$

Per = $\frac{3\pi}{2}$

$B = 2\pi \div \frac{3\pi}{2} \rightarrow 2\pi \cdot \frac{2}{3\pi} \rightarrow \frac{4}{3}$

b) What are the values of A, B and C in $f(t) = A\sin(Bt + C)$ needed to produce the graph that is the same as $f(t) = -2\cos\left(t + \frac{\pi}{4}\right)$?



$f(t) = 2\sin\left(t - \frac{\pi}{4}\right)$

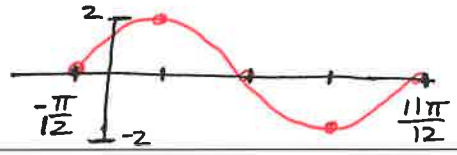
c) Given the amplitude is 2, the period is π, and the graph passes through the point (0, 1), write an equation in the form of $f(t) = A\sin(Bt + C)$ and graph the function.

$y = 2\sin(2t+C)$

$1 = 2\sin(2(0)+C)$

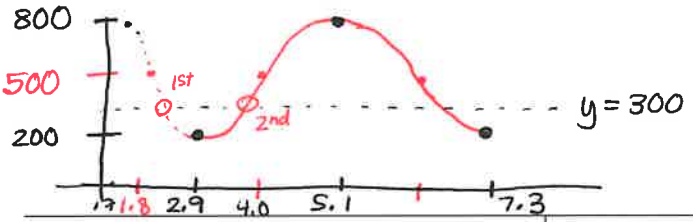
$\frac{1}{2} = \sin C \rightarrow \frac{\pi}{6}$ or $\frac{5\pi}{6}$

$y = 2\sin\left(2t + \frac{\pi}{6}\right) \rightarrow y = 2\sin 2\left(t + \frac{\pi}{12}\right)$



3. Naturalists find that the populations of some kinds of marine animals vary periodically. Assume that the population of dolphins varies sinusoidally with time. Records started being kept when time t = 0 years. A minimum number, 200 dolphins, occurred when t = 2.9 years. The next maximum, 800 dolphins, occurred at t = 5.1 years.

a. Sketch a graph of this sinusoid. (Label all important values)



b. Write an equation expressing the number of dolphins, d, as a function of time, t.

$d = -300\cos\frac{2\pi}{4.4}(x-2.9)+500$

$\frac{20\pi}{44} \rightarrow \frac{10\pi}{22} \rightarrow \frac{5\pi}{11}$

c. Predict the population when t = 7.

$d = -300\cos\frac{5\pi}{11}(7-2.9)+500$

$d \approx 227.11$

d. Dolphins are declared to be endangered when their population drops below 300. Between what two nonnegative values of t were the dolphins first endangered?

1st: $t \approx 2.311$

2nd: $t \approx 3.489$

$d = -300\cos\frac{5\pi}{11}(t-2.9)+500$

↑ These would be calculator problems ↑