

Last Name: SOLUTIONS

First Name: _____

Student ID: _____

Quiz 4

Question 1. (5 marks) Find the amplitude, period and displacement of the graph of

$$y = \frac{1}{2} \sin\left(\frac{1}{2}x - \frac{\pi}{4}\right)$$

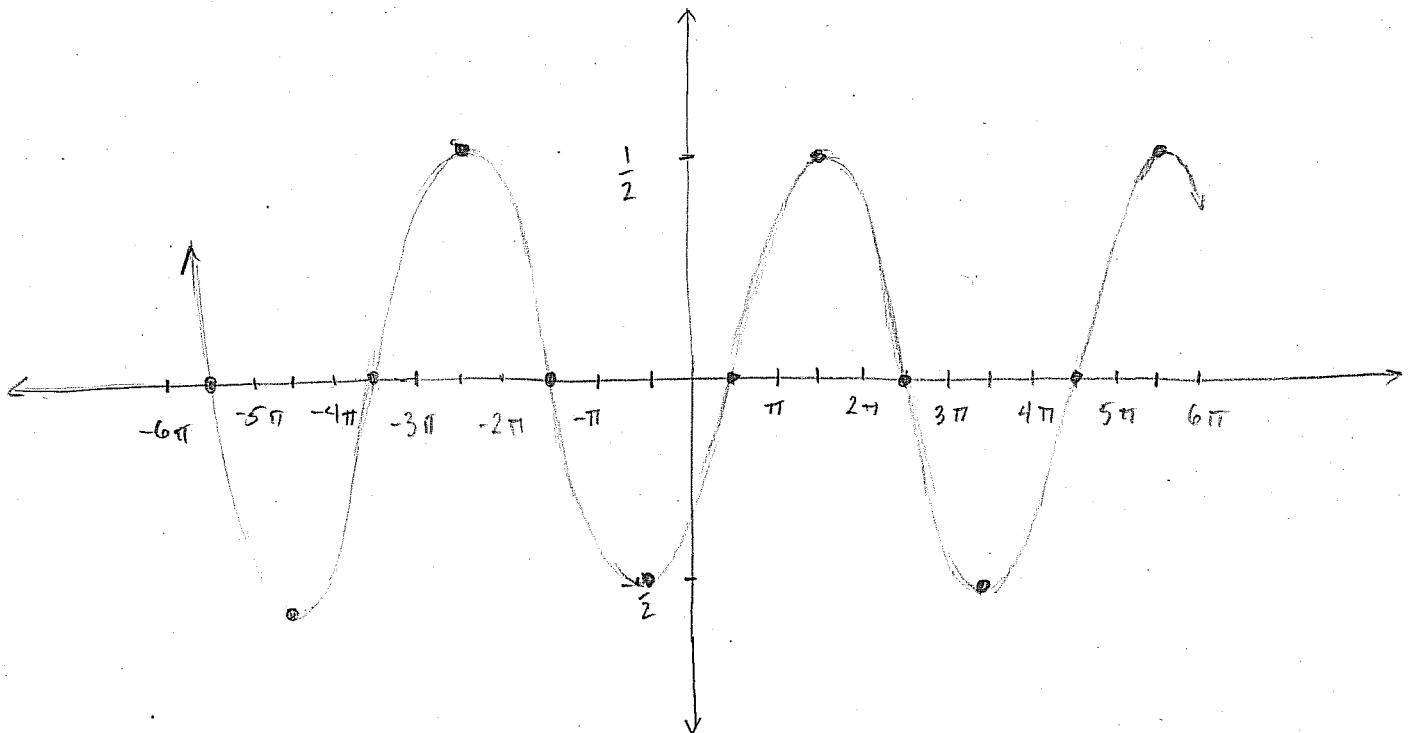
make a chart of key values in x and y and graph this function.

AMPLITUDE: $a = \left|\frac{1}{2}\right| = \frac{1}{2}$

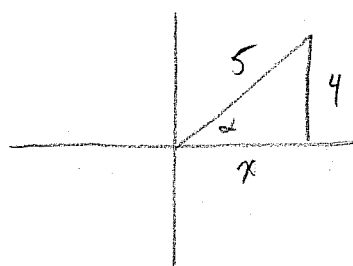
PERIOD: $\frac{2\pi}{b} = \frac{2\pi}{1/2} = 4\pi$

DISPLACEMENT: $-\frac{c}{b} = -\left(\frac{-\pi/4}{1/2}\right) = \frac{\pi}{2}$

| x | $\frac{\pi}{2}$ | $\frac{3\pi}{2}$ | $\frac{5\pi}{2}$ | $\frac{7\pi}{2}$ | $\frac{9\pi}{2}$ |
|-----|-----------------|------------------|------------------|------------------|------------------|
| y | 0 | $\frac{1}{2}$ | 0 | $-\frac{1}{2}$ | 0 |

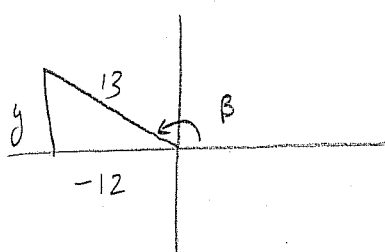


Question 2. (4 marks) Given $\sin \alpha = 4/5$ (α in the first quadrant) and $\cos \beta = -12/13$ (β in the second quadrant) find $\sin(\alpha - \beta)$.



$$x = \sqrt{5^2 - 4^2} = 3$$

$$\therefore \cos \alpha = \frac{3}{5}$$

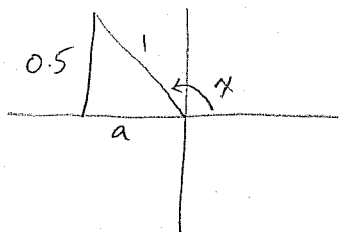


$$y = \sqrt{13^2 - (-12)^2} = 5$$

$$\sin \beta = \frac{5}{13}$$

$$\begin{aligned} \sin(\alpha - \beta) &= \sin \alpha \cos \beta - \cos \alpha \sin \beta \\ &= \left(\frac{4}{5}\right)\left(-\frac{12}{13}\right) - \left(\frac{3}{5}\right)\left(\frac{5}{13}\right) \\ &= -\frac{48}{65} - \frac{15}{65} = -\frac{63}{65} \end{aligned}$$

Question 3. (4 marks) Use the double angle formula to find $\tan 2x$ if $\sin x = 0.5$ (x in the second quadrant). (Do not use inverse trig functions.)



$$\begin{aligned} a &= -\sqrt{1^2 - 0.5^2} \\ &= -\sqrt{0.75} = -\frac{\sqrt{3}}{2} \end{aligned}$$

$$\Rightarrow \tan x = \frac{1/2}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}}$$

$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x} = \frac{2\left(\frac{1}{\sqrt{3}}\right)}{1 - \left(\frac{1}{\sqrt{3}}\right)^2} = \frac{\frac{2}{\sqrt{3}}}{1 - \frac{1}{3}}$$

$$= -\frac{2}{\sqrt{3}} \cdot \frac{3}{2} = -\frac{3}{\sqrt{3}} = -1.73$$