Lesson 8 – Assigned Questions

Assignment

1. Determine the amplitude, period, horizontal phase shift, and the vertical displacement for each function.

a) $y = \cos\left(x - \frac{\pi}{4}\right) + 3$ **b)** $y = 3\cos\frac{1}{2}\left(x - \frac{\pi}{2}\right)$ **c)** $y = 3\cos\frac{1}{2}x - \frac{\pi}{2}$

d) $y = \sin\left(4x - \frac{\pi}{2}\right)$ **e)** $y = -2\cos 3(x - 45°) + 4$ **f)** $y = 7\sin\left(\frac{1}{4}x + 20°\right) - 1$

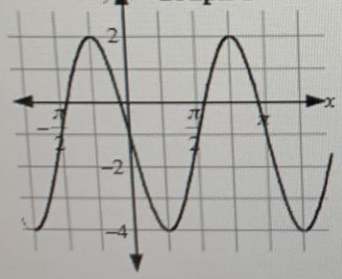
2. **a)** Determine the equation of a sine function that has a vertical displacement 3 units up, a horizontal phase shift of 60° to the left, a period of 210° and an amplitude of 4.

b) Determine the equation of a cosine function with a vertical displacement 5 units down, a horizontal phase shift of $\frac{2\pi}{3}$ radians to the right, a period of $\frac{5\pi}{4}$ and an amplitude of 3.

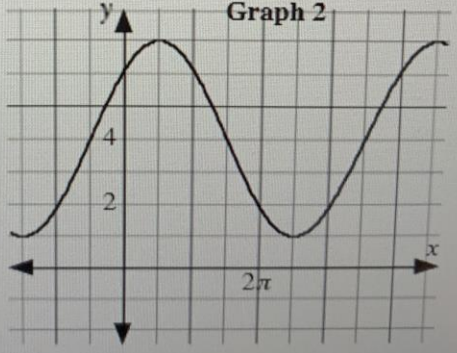
3. Graphs 1 and 2 each represent the graphs of trigonometric functions.

a) Assuming a minimum possible phase shift, write the equation of each graph in the form $y = a \sin[b(x - c)] + d$ if: **i)** $a > 0$ **ii)** $a < 0$

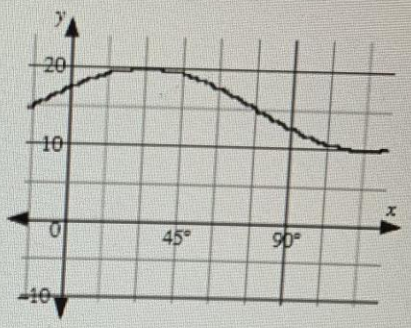
Graph 1



Graph 2

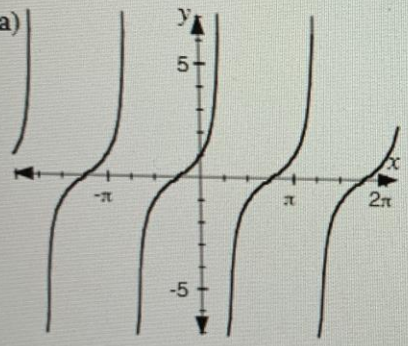


5. The sine graph shown has a maximum value of 20 and a minimum value of 10. If the graph has a minimum possible phase shift, determine the equation of the graph in the form $y = a \sin [b(x - c)] + d$ with $a > 0$.

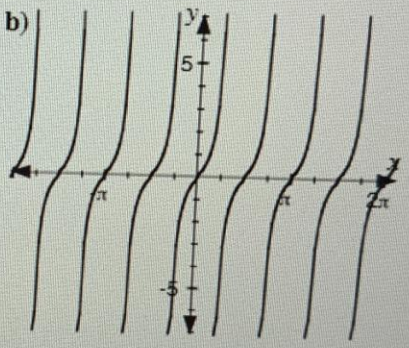


6. Determine the equation of each graph in the form $y = \tan b(x - c)$.

a)



b)



7. Determine the range of the functions represented below.

a) $y = 2 \sin x - 2$

b) $y = 3 \cos \frac{1}{2}\left(x - \frac{\pi}{2}\right) + 1$

c) $y = -\frac{1}{2} \cos 4(x - \pi) - 3$

d) $y = a \sin [b(x - c)] + d$, where $a > 0$

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8. Which of the following graphs has the same x-intercepts as the graph of $y = \cos x$?

A. $y = \cos 4x$

B. $y = 4 \cos x$

C. $y = \cos x + 4$

D. $y = \cos (x + 4)$

9. Which equation is a tangent function with period $\frac{\pi}{3}$, and a vertical displacement –3?

A. $y = \tan \frac{\pi}{3} x - 3$

B. $y = \tan 3(x - 3)$

C. $y = \tan 3x - 3$

D. $y = \tan 6x - 3$

10. The equation $y = \pi \cos (\pi x - \pi)$ has a period and a horizontal phase shift to the right, respectively, of

A. π and π

B. π and 1

C. 2 and π

D. 2 and 1

11. Which statement concerning the graph of $y = -4 \cos \frac{x}{2} + 2$ is <u>not</u> correct?

A. The maximum value is 6.

B. The period is 4π.

C. The amplitude is – 4.

D. The vertical displacement is 2.

Answer Key

1.

	amplitude	period	phase shift	vertical displacement
a)	1	2π	$\frac{\pi}{4}$ right	3 up
b)	3	4π	$\frac{\pi}{2}$ right	0
c)	3	4π	0	$\frac{\pi}{2}$ down
d)	1	$\frac{\pi}{2}$	$\frac{\pi}{8}$ right	0
e)	2	120°	45° right	4 up
f)	7	1440°	80° left	1 down

2. a) $y = 4 \sin \frac{12}{7}(x + 60°) + 3$

b) $y = 3 \cos \frac{8}{5}\left(x - \frac{2\pi}{3}\right) - 5$

(Note for **a)** and **b)**: the value of a can also be negative)

3. a) i) for $a > 0$, **Graph 1** $y = 3 \sin 2\left(x \pm \frac{\pi}{2}\right) - 1$, **Graph 2** $y = 3 \sin \frac{1}{2}\left(x + \frac{\pi}{2}\right) + 4$

ii) for $a < 0$, **Graph 1** $y = -3 \sin 2x - 1$, **Graph 2** $y = -3 \sin \frac{1}{2}\left(x - \frac{3\pi}{2}\right) + 4$

b) i) for $a > 0$, **Graph 1** $y = 3 \cos 2\left(x + \frac{\pi}{4}\right) - 1$, **Graph 2** $y = 3 \cos \frac{1}{2}\left(x - \frac{\pi}{2}\right) + 4$

ii) for $a < 0$, **Graph 1** $y = -3 \cos 2\left(x - \frac{\pi}{4}\right) - 1$, **Graph 2** $y = -3 \cos \frac{1}{2}\left(x + \frac{3\pi}{2}\right) + 4$

4. $y = 6 \cos \frac{1}{2}\left(x - \frac{5\pi}{4}\right) + 3$

5. $y = 5 \sin 2(x + 15°) + 15$

6. a) $y = \tan\left(x + \frac{\pi}{4}\right)$ **b)** $y = \tan 2x$

7. a) $\{y \mid -4 \le y \le 0, y \in R\}$ **b)** $\{y \mid -2 \le y \le 4, y \in R\}$

c) $\left\{y \mid -\frac{7}{2} \le y \le -\frac{5}{2}, y \in R\right\}$ **d)** $\{y \mid -a + d \le y \le a + d, y \in R\}$

8. B **9.** C **10.** D **11.** C **12.**

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