MAT 162, Homework #2, Spring 2025 Name _____

Instructions: Write your work up neatly and attach to this page. Record your final answers (only) directly on this page if they are short; if too long indicate which page of the work the answer is on and mark it clearly. Use exact values unless specifically asked to round.

1. For each function, state the amplitude, period and phase shift. Graph two periods of the function by hand using key points.

   a. $y = \frac{1}{3}\sin x$

   b. $y = -\sin\frac{4}{3}x$

   c. $y = 3\sin(\pi x + 2)$

   d. $y = -\frac{1}{2}\cos\frac{\pi}{3}x$

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

   f. $y = 2\sin\frac{1}{2}x + 1$

   g. $y = 4\sin\pi x$

   h. $y = 3\sin(2x - \pi)$

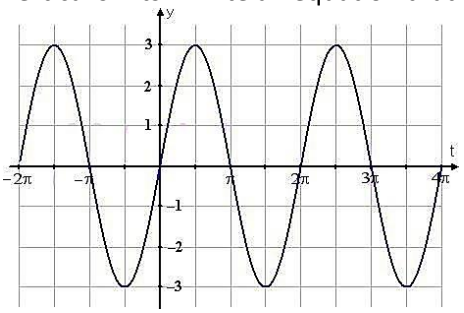
   i. $y = -2\cos x$

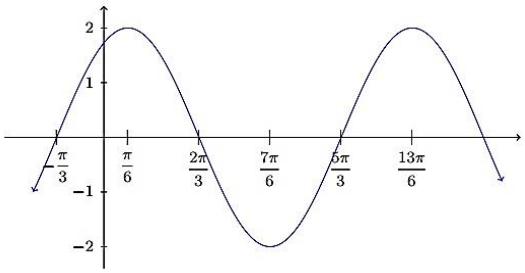
   j. $y = \cos\left(x + \frac{\pi}{2}\right)$

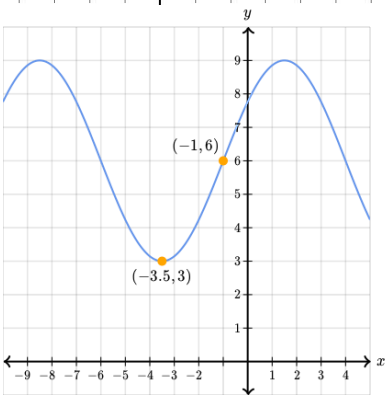
   k. $y = -4\cos\left(2x - \frac{\pi}{2}\right)$

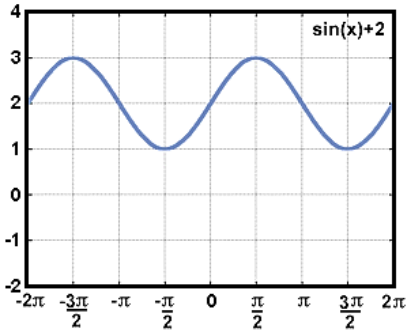
   l. $y = -2\sin 2\pi x + 2$

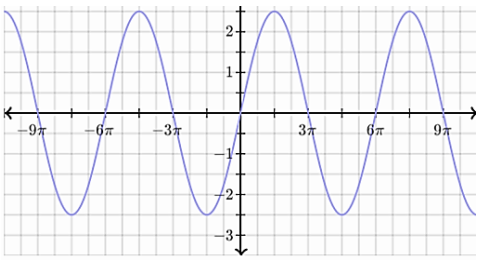
2. For each of the graphs below, find the amplitude and period, along with any horizontal or vertical shifts. Write an equation that could model the curve.

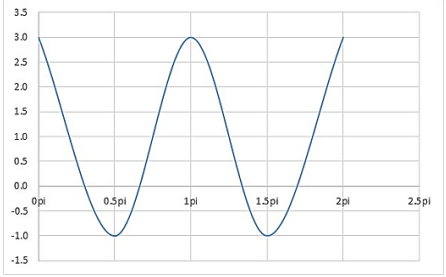












3. Graph two periods of each of the following functions by hand using key points. State the domain and range in each case.

a. $y = 3\tan\frac{x}{4}$

b. $y = 2\cot x$

c. $y = \frac{1}{2}\csc\frac{x}{2}$

d. $y = -\frac{1}{2}\sec \pi x$

e. $y = \sec\left(2x + \frac{\pi}{2}\right) - 1$

f. $y = \tan\left(x - \frac{\pi}{4}\right)$

g. $y = -2\cot\frac{\pi}{4}x$

h. $y = 3\sec x$

i. $y = \csc\left(x - \frac{\pi}{2}\right)$

j. $y = \left|\tan\frac{1}{2}x\right|$

4. Find the value of each expression.

a. $\sin^{-1}\left(\frac{1}{2}\right)$

b. $\tan^{-1}(-1)$

c. $\sin^{-1}\left(\sin\frac{\pi}{3}\right)$

d. $\tan(tan^{-1}\,125)$

e. $\sin(sin^{-1}\,\pi)$

f. $\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right)$

g. $\cos^{-1}(0)$

h. $\cos^{-1}\left(\cos\frac{4\pi}{3}\right)$

i. $\tan^{-1}\left(\tan\left(-\frac{\pi}{3}\right)\right)$

j. $\cos(cos^{-1}\,0.57)$

5. Use a sketch to find the exact value of each expression.

a. $\cos\left(sin^{-1}\frac{4}{5}\right)$

b. $\sin\left(cos^{-1}\left(\frac{\sqrt{2}}{2}\right)\right)$

c. $\sin\left(tan^{-1}\left(-\frac{3}{4}\right)\right)$

d. $\cot\left(sin^{-1}\frac{5}{13}\right)$

e. $\sec\left(sin^{-1}\left(-\frac{1}{2}\right)\right)$

f. $\csc\left(cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)\right)$

6. Simplify each trigonometric expression to eliminate the trig functions by drawing a triangle.

a. $\tan\,(\cos^{-1}x)$

b. $\cot\left(tan^{-1}\frac{x}{\sqrt{3}}\right)$

c. $\sin(cos^{-1}\,2x)$

d. $\sec\left(sin^{-1}\frac{x}{\sqrt{x^2+4}}\right)$

7. Use transformations to graph each function. State the domain and range of each.

a. $y = -2\tan^{-1}x$

b. $y = \sin^{-1}\left(\frac{x}{2}\right)$

c. $y = \cos^{-1}(x+1)$

d. $y = \sin^{-1}(x-2) - \frac{\pi}{2}$

8. A hot air balloon is rising vertically from a point on level ground 125 feet from the point directly under the passenger compartment. The angle of elevation of the hot air balloon changes from 19.2° to 31.7°. How far, to the nearest tenth of a foot, does the balloon rise during this period?

9. For each of the angles and directions on the graph below, translate each into a compass bearing.