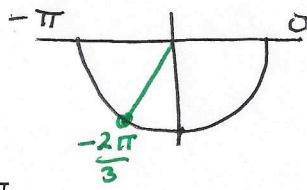


29. Find x given $\sec(x) = -2$ and $-\pi \leq x \leq 0$.



$$x = -\frac{2\pi}{3}$$

- a) $x = -\frac{2\pi}{3}$ b) $x = -\frac{5\pi}{6}$ c) $x = -\frac{\pi}{3}$ d) $x = -\frac{\pi}{6}$ e) None of these

30. What is the period for the graph of $f(x) = 2\cos\left(\frac{5}{12}x - \frac{3\pi}{8}\right)$? Period = $\frac{2\pi}{B}$; $B = \frac{5}{12}$ here.

$$\text{Per} = \frac{2\pi}{\frac{5}{12}} = \frac{2\pi}{1} \cdot \frac{12}{5} = \frac{24\pi}{5}$$

- a) $\frac{24\pi}{5}$ b) $\frac{6\pi}{5}$ c) $\frac{5\pi}{24}$ d) $\frac{5\pi}{6}$ e) None of these

31. What is the direction and amount of shift for the graph of $f(x) = 2\cos\left(\frac{5}{12}x - \frac{3\pi}{8}\right)$? $\frac{5}{12}x - \frac{3\pi}{8} = 0$

To find the shift we set argument = 0

Because x is positive, the shift is to the right

$$\frac{12}{5} \cdot \frac{5}{12} x = \frac{3\pi}{8} \cdot \frac{12}{5}$$

$$x = \frac{36\pi}{40}$$

$$x = \frac{9\pi}{10}$$

- a) right $\frac{9\pi}{10}$ b) right $\frac{10\pi}{9}$ c) left $\frac{10\pi}{9}$ d) left $\frac{9\pi}{10}$ e) None of these

32. In the graph of $f(x) = -4\sec\left(\frac{8}{5}x\right)$, where is the first asymptote on the positive x -axis?

It is helpful to draw the graph of secant to figure out what to look for. The guideline graph is $g(x) = -4\cos\left(\frac{8}{5}x\right)$:

So, we first need the period. The answer is the quarter-period.

$$\text{Per} = \frac{2\pi}{\frac{8}{5}} = \frac{2\pi}{1} \cdot \frac{5}{8} = \frac{10\pi}{8} = \frac{5\pi}{4}$$

$$\text{qtr-per} = \frac{1}{4} \cdot \frac{5\pi}{4} = \frac{5\pi}{16}$$

The first asymptote is at the quarter-period

- a) at $x = \frac{5\pi}{16}$ b) at $x = \frac{5\pi}{8}$ c) at $x = \frac{4\pi}{5}$ d) at $x = \frac{8\pi}{5}$ e) None of these

33. In the graph of $f(x) = 5\csc\left(\frac{5}{8}x\right)$, where is the first asymptote on the positive x -axis?

The guideline graph is $g(x) = 5\sin\left(\frac{5}{8}x\right)$

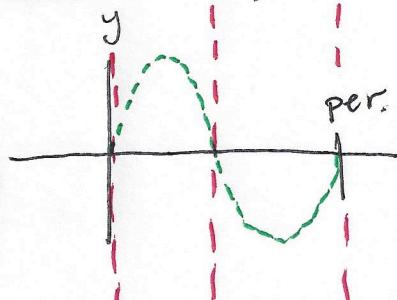
The 1st asymptote on the positive x -axis is at the half-period.

$$\text{Per} = \frac{2\pi}{\frac{5}{8}} = \frac{2\pi}{1} \cdot \frac{8}{5} = \frac{16\pi}{5}$$

$$\text{half-per} = \frac{1}{2} \cdot \frac{16\pi}{5} = \frac{8\pi}{5}$$

half-per.

per.



- a) at $x = \frac{8\pi}{5}$ b) at $x = \frac{4\pi}{5}$ c) at $x = \frac{5\pi}{8}$ d) at $x = \frac{5\pi}{16}$ e) None of these

For #34 and 35, there are three related identities for $\cos(2\theta)$:

34. Given θ is in Quadrant I and $\sec \theta = \sqrt{5}$, evaluate $\cos(2\theta)$.

Because $\sec \theta = \sqrt{5}$, we know that $\cos \theta = \frac{1}{\sqrt{5}}$.

So, use $\cos(2\theta) = 2\cos^2(\theta) - 1$

$$\begin{aligned}\cos(2\theta) &= 2 \left(\frac{1}{\sqrt{5}}\right)^2 - 1 \\ &= 2 \cdot \frac{1}{5} - 1 \\ &= \frac{2}{5} - \frac{5}{5} \\ &= \frac{-3}{5}\end{aligned}$$

- a) $\frac{3}{5}$ b) $-\frac{3}{5}$ c) $-\frac{\sqrt{5}}{5}$ d) $\frac{\sqrt{5}}{5}$ e) None of these

- (i) $\cos^2 \theta - \sin^2 \theta$
 (ii) $2\cos^2 \theta - 1$
 (iii) $1 - 2\sin^2 \theta$

35. Given θ is in Quadrant II and $\csc \theta = \sqrt{6}$, evaluate $\cos(2\theta)$.

Because $\csc \theta = \sqrt{6}$, we know that $\sin \theta = \frac{1}{\sqrt{6}}$.

So, use $\cos(2\theta) = 1 - 2\sin^2(\theta)$

$$\begin{aligned}\cos(2\theta) &= 1 - 2 \cdot \left(\frac{1}{\sqrt{6}}\right)^2 \\ &= 1 - 2 \cdot \frac{1}{6} \\ &= \frac{6}{6} - \frac{2}{6} \\ &= \frac{4}{6} = \frac{2}{3}\end{aligned}$$

- a) $\frac{2}{3}$ b) $-\frac{2}{3}$ c) $-\frac{1}{3}$ d) $\frac{1}{3}$ e) None of these

36. In triangle ABC, $a = 14$, $b = 6$, and $c = 10$. Use a Law of Cosines to find $m\angle A$.

(Hint: $11^2 = 121$, $12^2 = 144$, $13^2 = 169$, $14^2 = 196$, $15^2 = 225$, $16^2 = 256$)

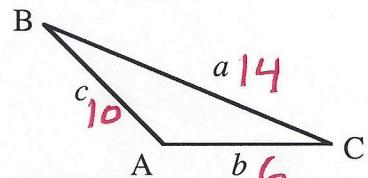
$$a^2 = b^2 + c^2 - 2bc \cdot \cos(A) \quad \cos(A) = \frac{b^2 + c^2 - a^2}{2bc}$$

Because we are to find $m\angle A$, we use the second formula:

So, $\cos A = -\frac{1}{2}$ which means

$\angle A$ must be 120°

- a) 30° b) 60° c) 120° d) 150° e) None of these



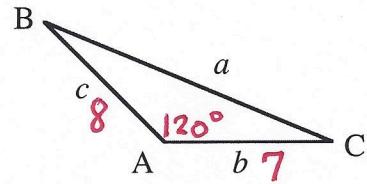
$$\begin{aligned}\cos A &= \frac{6^2 + 10^2 - 14^2}{2(6)(10)} \\ &= \frac{36 + 100 - 196}{120} \\ &= \frac{-60}{120} = -\frac{1}{2}\end{aligned}$$

Note: on the actual final exam, you won't be given the hint about ($11^2 = 121$, ..., $16^2 = 256$). You won't need this hint.

37. In triangle ABC, $m\angle A = 120^\circ$, $b = 7$, and $c = 8$. Use a Law of Cosines to find the length of side a .

(Hint: $11^2 = 121$, $12^2 = 144$, $13^2 = 169$, $14^2 = 196$, $15^2 = 225$, $16^2 = 256$)

$$a^2 = b^2 + c^2 - 2bc \cdot \cos(A) \quad \cos(A) = \frac{b^2 + c^2 - a^2}{2bc}$$



Because we are to find side a , use the first formula.

$$a^2 = (7)^2 + (8)^2 - 2(7)(8) \cdot \cos(120^\circ)$$

$$a^2 = 49 + 64 - 112 \cdot \left(-\frac{1}{2}\right)$$

$$a^2 = 113 - (-56)$$

$$a^2 = 113 + 56$$

$$a^2 = 169$$

$$a = \sqrt{169}$$

$$\boxed{a = 13}$$

a) 15

b) 13

c) $\frac{13}{2}$

d) $\frac{15}{2}$

e) None of these

38. Identify the function shown. Write it in the form of either $f(x) = A \sin(Bx)$ or $f(x) = A \cos(Bx)$

① First, this is a positive sine function with an amplitude of 4, so

② $f(x) = 4 \sin(\text{ } x)$

Our job is to find B :

$$B = \frac{2\pi}{\text{per}}$$

⑤ $\text{per} = \frac{3\pi}{14} \cdot \frac{4}{3} = \frac{4\pi}{14}$

$$\text{per} = \frac{2\pi}{7}$$

⑥ $\text{per} = \frac{2\pi}{\frac{2\pi}{7}} = \frac{2\pi}{1} \cdot \frac{7}{2\pi} = 7$

⑦ So, $\boxed{f(x) = 4 \sin(7x)}$

a) $f(x) = 4 \sin\left(\frac{4}{7}x\right)$

b) $f(x) = 4 \sin\left(\frac{7}{4}x\right)$

c) $f(x) = 4 \sin\left(\frac{28}{3}x\right)$

d) $f(x) = 4 \sin(7x)$

e) None of these

