Lesson 3: Using Technology to Solve More Complex Equations

Question #1

Reference Q.18007

Solve $\sin^2(x) = \frac{1}{2}$

a. by algebraically.

b. by using a calculator.

Question #2

Reference Q.18008

Solve $\sec^2(x) = 4$

a. by algebraically.

b. by using a calculator.

Question #3

Reference Q.18009

Solve $\tan\left(\frac{x}{2}\right) = 2$ for all $x \in \mathbb{R}$.

Question #4

Reference Q.18010

Solve $\sin(2x) = 0.27$ for all $x \in \mathbb{R}$.

Question #5

Reference Q.18011

Solve $3\sin^3(x) = \sin^2(x)$ for all $x \in \mathbb{R}$. (Hint: You may want to simplify the equation algebraically.)

Question #6

Reference Q.18012

Solve $3\cos(2x) = 3\cos(x) - 2$ for $x \in [0, 2\pi)$.

Question #7

Reference Q.18013

Solve $\sin(2x) = \sqrt{3}\cos(x)$ for $x \in [-\pi, \pi]$.

Question #8

Reference Q.18014

Solve $\sec^2(x) = \tan(x) + 3$ for $x \in (-2\pi, -\pi]$.

Question #9

Reference Q.18015

Solve $\cos\left(x + \frac{5\pi}{6}\right) = 0$ for $x \in [0, 2\pi)$.

Question #10

Reference Q.18016

Solve $\sin\left(2x - \frac{\pi}{3}\right) = -\frac{1}{3}$ for $x \in [0, 2\pi)$.

Question #11

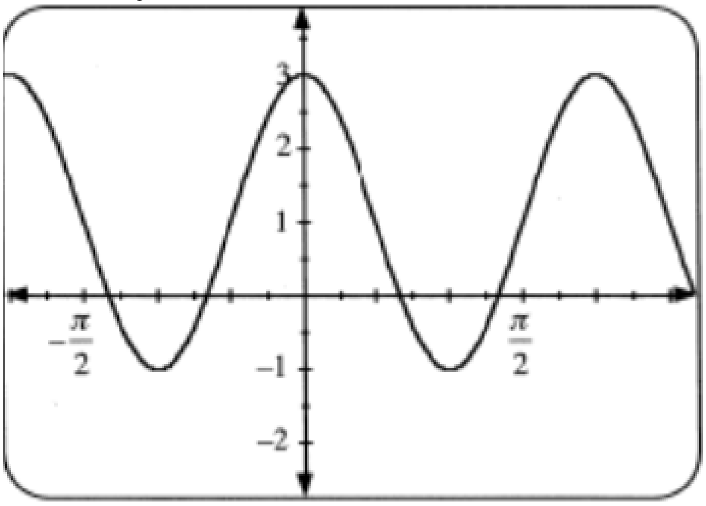
Reference Q.18017

Solve $\sin(x) + \cos(x) = 1.2$ for $x \in [0, 2\pi)$.

Question #12

Reference Q.12546

The graph of $y = 2\cos 3x + 1$ is displayed on a graphing calculator.



a. Describe the effects of the parameters 2, 3, and 1 on the graph of $y = \cos x$.

b. A student was asked to find all the values of θ which satisfy the equation $\cos 3x = -\frac{1}{2}, -\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$. Explain how the student can find these values from the graph above and mark these points on the grid.

c. Show how to find these values by solving algebraically $\cos 3x = -\frac{1}{2}, -\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$.

Question #13

Reference Q.18018

The depth of the ocean reaches a maximum of 6 feet and a minimim of 2 feet. The depth d (in feet) of the ocean is modeled by $h = 2\sin\frac{\pi}{8}t + 4$, where t is the time (in hours) with $t = 0$ representing 12:00 A.M.

a. Graph the function on your calculator.

b. What is the period of this function?

c. At what time(s) on the interval $0 \leq t \leq 16$ will the depth of the ocean be 5 feet?

Question #14

Reference Q.18019

Jacksonville, Florida has a latitude of $30^\circ N$. At this latitude, the position of the sun at sunrise can be modeled by $D = 30\sin\left(\frac{2\pi}{365}t - 1.3\right)$ where t is the time (in days) with $t = 1$ representing January 1. In this model, D represents the number of degrees north of due east that the sun rises. What value of t corresponds to the first day that the sun is 20° north of due east at sunrise? Round your answer to the nearest integer.

Question #15

Reference Q.18020

Find conditions involving the constants b and c that will guarantee thtat the equation $\sin^2(x) + b\sin(x) + c = 0$ has at least one solution on an interval of length 2π.

Question #16

Reference Q.18021

The height h (in feet) of two people in different seats on a Ferris wheel can be modeled by $h_1 = 5\cos 2t + 5$ and $h_2 = 5\cos[2\left(t - \frac{\pi}{6}\right)] + 5, 0 \leq t \leq 2$ where t is the time (in minutes). At what times (in seconds) are the two people at the same height.