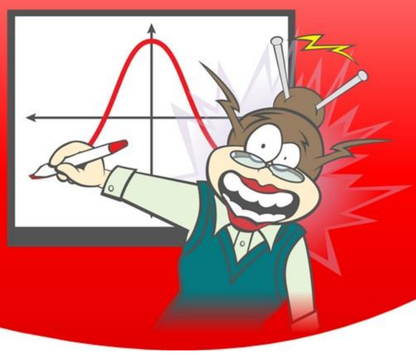


Circular/Trigonometric Functions

Each of the questions included here can be solved using either the TI-Nspire CAS.

Scan the QR code or use the link:

Question 1:

Find the exact solutions to the equation $4sin^2(2x) - 3 = 0$ where $-\pi \le x \le \pi$.

Question 2:

Find the first three positive solutions to the equation $\sqrt{3}\tan(2x) = 1$.

Question 3:

Find the sum of the solutions of $\sin\left(\frac{x}{2}\right) = \frac{1}{\sqrt{2}}$ for $0 \le x \le 6\pi$.

Question 4:

Find the number of solutions to the equation $\sqrt{3} + 2\cos\left(\frac{\pi x}{3}\right) = 0$ where $x \in [-12, 6]$

Question 5:

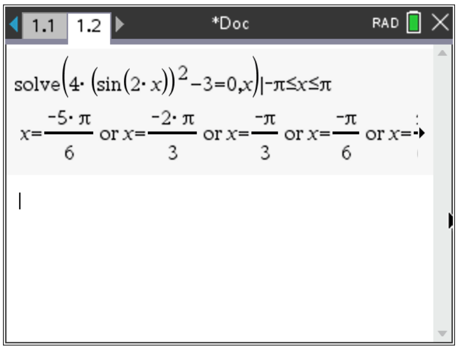
Consider the function $f(x) = 2\cos\left(\frac{x}{3}\right) + 1$ for $0 \le x \le 6\pi$. Find the value(s) of x for which $f(x) < 0$.

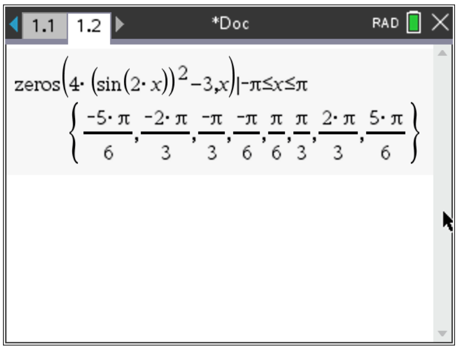
Answers

Question 1

Solutions: $x = -\frac{5\pi}{6}, -\frac{2\pi}{3}, -\frac{\pi}{3}, -\frac{\pi}{6}, \frac{\pi}{6}, \frac{\pi}{3}, \frac{2\pi}{3}, \frac{5\pi}{6}$

The solve(function or zeros(function can be used here. The domain restriction is included at the end of the syntax, as shown below. The advantage of the zeros(function is that our solutions are given in a set, as shown.

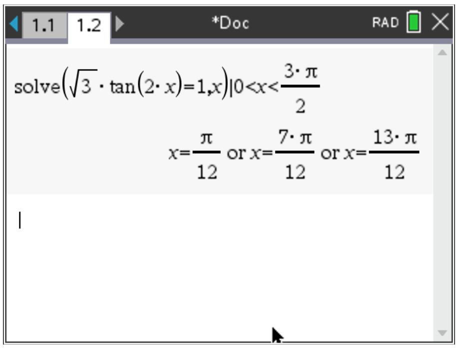


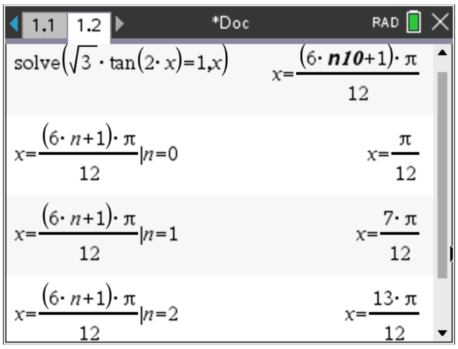


Question 2

Solutions: $x = \frac{\pi}{12}, \frac{7\pi}{12}, \frac{13\pi}{12}$

You can use the fact that the period of $y = \tan(2x)$ is $\frac{\pi}{2}$ and so the first three solutions will be in the domain $x \in (0, \frac{3\pi}{2})$. Alternatively you can make use of the general solutions, and find the first three solutions using $n = 0, 1, 2$.

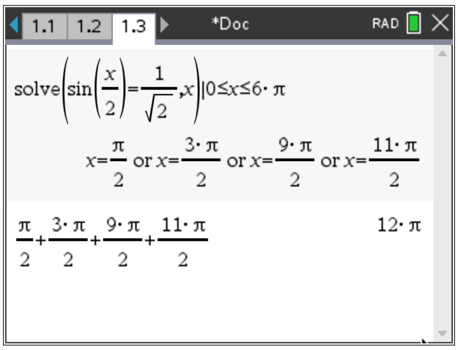


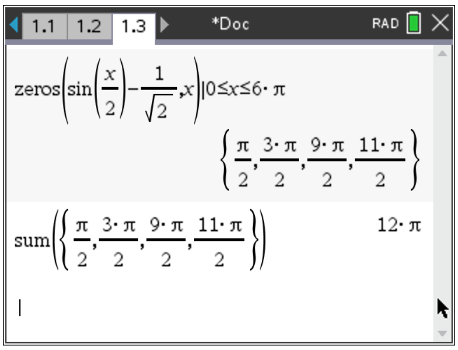


Question 3

Solution: 12π

You can use the solve function to find the solutions and then add them to find the sum. Alternatively you can use the zeros(function and then use sum(

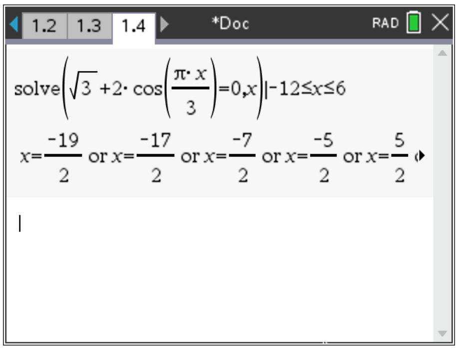


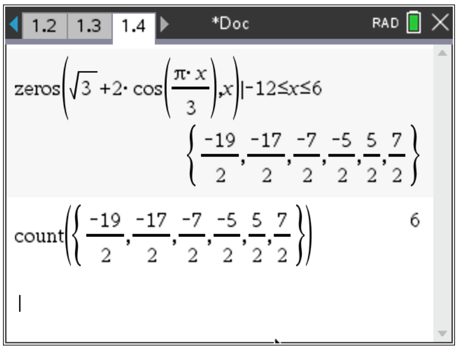


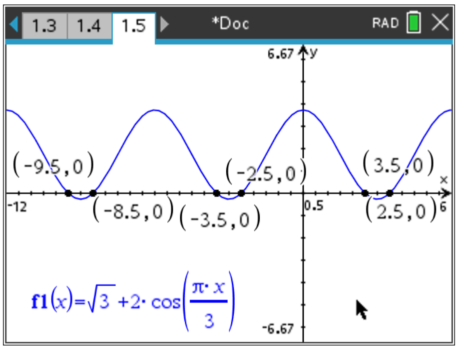
Question 4

Solution: 6

You can use the solve function or view the graph; however, using the zeros(function and then count(is a nice way to find the number of solutions.







Question 5

Solution: $2\pi < x < 4\pi$ or $x \in (2\pi, 4\pi)$

As with any inequation, it is a good idea to look at a graph in addition to using the calculator page. If you use the solve function to solve an equation, be sure to write your solution as the appropriate interval, rather than simply transcribing from the CAS. If you attempt o solve an inequation and the CAS gives you general solutions (this happens sometimes!) then remember, you can use the general solution to find specific solutions.