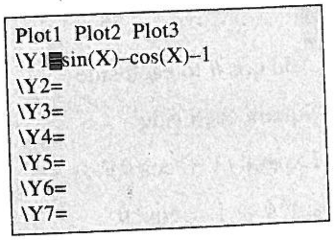


Figure 1

Define the expression on the left side of this equation as function Y1 (Figure 1) your calculator to radian mode and graph the function using the following wi settings.

$$0 \le x \le 2\pi, \text{ scale} = \pi/2; \ -3 \le y \le 2, \text{ scale} = 1$$

The solutions of the equation will be the zeros (x-intercepts) of this function. the graph, we see that there are only two solutions. Use the feature of your c lator that will allow you to evaluate the function from the graph, and verif $x = \pi/2$ and $x = \pi$ are x-intercepts (Figure 2). It is clear from the grap $x = 3\pi/2$ is not a solution.

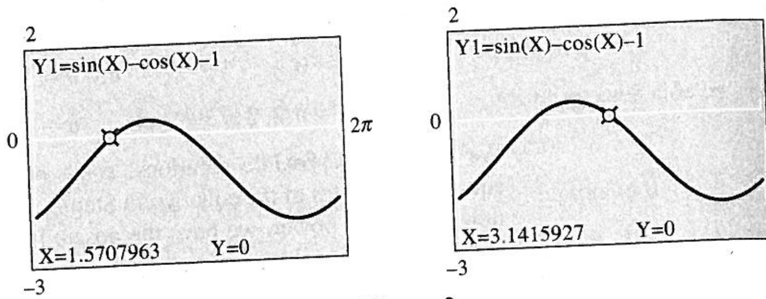


Figure 2

GETTING READY FOR CLASS

After reading through the preceding section, respond in your own words in complete sentences.

a. What is the first step in solving the equation $2 \cos x - 1 = \sec x$?

b. Why do we need 0 on one side of a quadratic equation in order to solv equation?

c. How many solutions between 0 and 2π does the equation $\cos x = 0$ tain?

d. How do you factor the left side of the equation $2 \sin \theta \cos \theta + \sqrt{2} \cos \theta = 0$?

PROBLEM SET 6.2

Solve each equation for θ if $0° \le \theta < 360°$. Give your answers in degrees

1. $\sqrt{3} \sec \theta = 2$

2. $\sqrt{2} \csc \theta = 2$

3. $\sqrt{2} \csc \theta + 5 = 3$

4. $2\sqrt{3} \sec \theta + 7 = 3$

5. $4 \sin \theta - 2 \csc \theta = 0$

6. $4 \cos \theta - 3 \sec \theta = 0$

7. $\sec \theta - 2 \tan \theta = 0$

8. $\csc \theta + 2 \cot \theta = 0$

9. $\sin 2\theta - \cos \theta = 0$

10. $2 \sin \theta + \sin 2\theta = 0$

11. $2 \cos \theta + 1 = \sec \theta$

12. $2 \sin \theta - 1 = \csc \theta$

Solve each equation for x if $0 \le x < 2\pi$. Give your answers in radians using exact values only.

13. $\cos 2x - 3\sin x - 2 = 0$
14. $\cos 2x - \cos x - 2 = 0$
15. $\cos x - \cos 2x = 0$
16. $\sin x = -\cos 2x$
17. $2\cos^2 x + \sin x - 1 = 0$
18. $2\sin^2 x - \cos x - 1 = 0$
19. $4\sin^2 x + 4\cos x - 5 = 0$
20. $4\cos^2 x - 4\sin x - 5 = 0$
21. $2\sin x + \cot x - \csc x = 0$
22. $2\cos x + \tan x = \sec x$
23. $\sin x + \cos x = \sqrt{2}$
24. $\sin x - \cos x = \sqrt{2}$

Solve for θ if $0° \le \theta < 360°$.

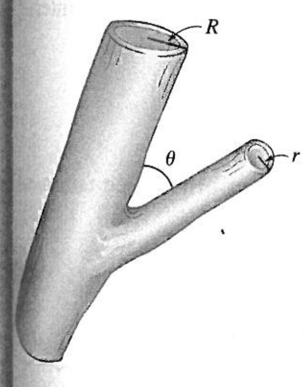
25. $\sqrt{3}\sin\theta + \cos\theta = \sqrt{3}$
26. $\sin\theta - \sqrt{3}\cos\theta = \sqrt{3}$
27. $\sqrt{3}\sin\theta - \cos\theta = 1$
28. $\sin\theta - \sqrt{3}\cos\theta = 1$
29. $\sin\frac{\theta}{2} - \cos\theta = 0$
30. $\sin\frac{\theta}{2} + \cos\theta = 1$
31. $\cos\frac{\theta}{2} - \cos\theta = 1$
32. $\cos\frac{\theta}{2} - \cos\theta = 0$

For each equation, find all degree solutions in the interval $0° \le \theta < 360°$. If rounding is necessary, round to the nearest tenth of a degree. Use your graphing calculator to verify each solution graphically.

33. $6\cos\theta + 7\tan\theta = \sec\theta$
34. $13\cot\theta + 11\csc\theta = 6\sin\theta$
35. $23\csc^2\theta - 22\cot\theta\csc\theta - 15 = 0$
36. $18\sec^2\theta - 17\tan\theta\sec\theta - 12 = 0$
37. $7\sin^2\theta - 9\cos 2\theta = 0$
38. $16\cos 2\theta - 18\sin^2\theta = 0$

Write expressions that give all solutions to the equations you solved in the problems given below.

39. Problem 3
40. Problem 4
41. Problem 23
42. Problem 24
43. Problem 31
44. Problem 32



45. Physiology In the human body, the value of θ that makes the following expression 0 is the angle at which an artery of radius r will branch off from a larger artery of radius R in order to minimize the energy loss due to friction. Show that the following expression is 0 when $\cos\theta = r^4/R^4$.

$$r^4\csc^2\theta - R^4\csc\theta\cot\theta$$

46. Physiology Find the value of θ that makes the expression in Problem 45 zero, if $r = 2$ mm and $R = 4$ mm. (Give your answer to the nearest tenth of a degree.)

Solving the following equations will require you to use the quadratic formula. Solve each equation for θ between 0° and 360°, and round your answers to the nearest tenth of a degree.

47. $2\sin^2\theta - 2\cos\theta - 1 = 0$
48. $2\cos^2\theta + 2\sin\theta - 1 = 0$
49. $\cos^2\theta + \sin\theta = 0$
50. $\sin^2\theta = \cos\theta$
51. $2\sin^2\theta = 3 - 4\cos\theta$
52. $4\sin\theta = 3 - 2\cos^2\theta$

Use your graphing calculator to find all radian solutions in the interval $0 \le x < 2\pi$ for each of the following equations. Round your answers to four decimal places.

53. $\cos x + 3\sin x - 2 = 0$
54. $2\cos x + \sin x + 1 = 0$
55. $\sin^2 x - 3\sin x - 1 = 0$
56. $\cos^2 x - 3\cos x + 1 = 0$
57. $\sec x + 2 = \cot x$
58. $\csc x - 3 = \tan x$