Use fixed-point iteration to solve the equations in Exercises 1–6. Obtain 5 decimal place precision.

1. $2x = e^{-x}$, start with $x_0 = 0.3$

2. $1 + \frac{1}{4} \sin x = x$

3. $\cos \frac{x}{3} = x$

4. $(x + 9)^{1/3} = x$

5. $\frac{1}{2 + x^2} = x$

6. Solve $x^3 + 10x - 10 = 0$ by rewriting it in the form $1 - \frac{1}{10}x^3 = x$.

In Exercises 7–16, use Newton's Method to solve the given equations to the precision permitted by your calculator.

7. Find $\sqrt{2}$ by solving $x^2 - 2 = 0$.

8. Find $\sqrt{3}$ by solving $x^2 - 3 = 0$.

9. Find the root of $x^3 + 2x - 1 = 0$ between 0 and 1.

10. Find the root of $x^3 + 2x^2 - 2 = 0$ between 0 and 1.

11. Find the two roots of $x^4 - 8x^2 - x + 16 = 0$ in $[1, 3]$.

12. Find the three roots of $x^3 + 3x^2 - 1 = 0$ in $[-3, 1]$.

13. Solve $\sin x = 1 - x$. A sketch can help you make a guess x_0.

14. Solve $\cos x = x^2$. How many roots are there?

15. How many roots does the equation $\tan x = x$ have? Find the one between $\pi/2$ and $3\pi/2$.

16. Solve $\frac{1}{1 + x^2} = \sqrt{x}$ by rewriting it $(1 + x^2)\sqrt{x} - 1 = 0$.

17. If your calculator has a built-in Solve routine, or if you use computer software with such a routine, use it to solve the equations in Exercises 7–16.

Find the maximum and minimum values of the functions in Exercises 18–19.

18. $\dfrac{\sin x}{1 + x^2}$

19. $\dfrac{\cos x}{1 + x^2}$

20. Let $f(x) = x^2$. The equation $f(x) = 0$ clearly has solution $x = 0$. Find the Newton's Method iterations x_1, x_2, and x_3, starting with $x_0 = 1$.

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