t².

Section 3.8 (page 233)

In the answers for Exercises 1 and 3, the values in the tables have been rounded for convenience. Because a calculator or a computer program calculates internally using more digits than they display, you may produce slightly different values than those shown in the tables.

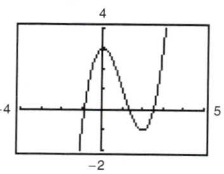
1.

n	x_n	$f(x_n)$	$f'(x_n)$	$\frac{f(x_n)}{f'(x_n)}$	$x_n - \frac{f(x_n)}{f'(x_n)}$
1	2.2000	−0.1600	4.4000	−0.0364	2.2364
2	2.2364	0.0015	4.4728	0.0003	2.2361

3.

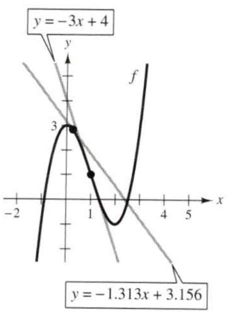
n	x_n	$f(x_n)$	$f'(x_n)$	$\frac{f(x_n)}{f'(x_n)}$	$x_n - \frac{f(x_n)}{f'(x_n)}$
1	1.6	−0.0292	−0.9996	0.0292	1.5708
2	1.5708	0	−1	0	1.5708

5. −1.587 **7.** 0.682 **9.** 1.250, 5.000
11. 0.900, 1.100, 1.900 **13.** 1.935 **15.** 0.569
17. 4.493 **19.** (a) Proof (b) $\sqrt{5} \approx 2.236$; $\sqrt{7} \approx 2.646$
21. $f'(x_1) = 0$ **23.** $2 = x_1 = x_3 = \ldots ; 1 = x_2 = x_4 = \ldots$
25. 0.74 **27.** Proof
29. (a)



(b) 1.347 (c) 2.532

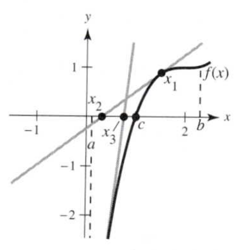
(d)



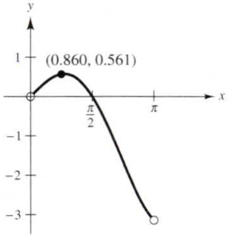
x-intercept of $y = -3x + 4$ is $\frac{4}{3}$.
x-intercept of $y = -1.313x + 3.156$ is approximately 2.404.

(e) If the initial estimate $x = x_1$ is not sufficiently close to the desired zero of a function, the x-intercept of the corresponding tangent line to the function may approximate a second zero of the function.

31. Answers will vary. Sample answer: If f is a function continuous on $[a, b]$ and differentiable on (a, b), where $c \in [a, b]$ and $f(c) = 0$, Newton's Method uses tangent lines to approximate c. First, estimate an initial x_1 close to c. (See graph.) Then determine x_2 using $x_2 = x_1 - f(x_1)/f'(x_1)$. Calculate a third estimate x_3 using $x_3 = x_2 - f(x_2)/f'(x_2)$. Continue this process until $|x_n - x_{n+1}|$ is within the desired accuracy and let x_{n+1} be the final approximation of c.



33. 0.860 **35.** (1.939, 0.240)



37. $x \approx 1.563$ mi **39.** 15.1, 26.8 **41.** False: let $f(x) = \dfrac{x^2 - 1}{x - 1}$.
43. True **45.** 0.217