2.8 | EXERCISES

1–4 ■ Find the linearization $L(x)$ of the function at a.

1. $f(x) = x^4 + 3x^2$, $\quad a = -1$

2. $f(x) = \sin x$, $\quad a = \pi/6$

3. $f(x) = \sqrt{x}$, $\quad a = 4$ **4.** $f(x) = x^{3/4}$, $\quad a = 16$

5. Find the linear approximation of the function $f(x) = \sqrt{1 - x}$ at $a = 0$ and use it to approximate the numbers $\sqrt{0.9}$ and $\sqrt{0.99}$. Illustrate by graphing f and the tangent line.

6. Find the linear approximation of the function $g(x) = \sqrt[3]{1 + x}$ at $a = 0$ and use it to approximate the numbers $\sqrt[3]{0.95}$ and $\sqrt[3]{1.1}$. Illustrate by graphing g and the tangent line.

7–10 ■ Verify the given linear approximation at $a = 0$. Then determine the values of x for which the linear approximation is accurate to within 0.1.

7. $\sqrt[4]{1 + 2x} \approx 1 + \frac{1}{2}x$ **8.** $\tan x \approx x$

9. $1/(1 + 2x)^4 \approx 1 - 8x$ **10.** $(1 + x)^{-3} \approx 1 - 3x$

11–14 ▪ Use a linear approximation (or differentials) to estimate the given number.

11. $(1.999)^4$

12. $\sqrt[3]{1001}$

13. $(8.06)^{2/3}$

14. $1/4.002$