Simplify each of the following expressions as much as possible. Express final answers with positive exponents.

1. $\left(4x^3\right)^2$

2. $(-z)^3(3z)^4$

3. $\dfrac{25p^8}{10p^4q}$

4. $8^{-1/3}$

5. $\dfrac{a^4b^{-5}}{b^2a^{-3}}$

6. $\sqrt[3]{27^2}$

7. $\dfrac{12(1+y)^5}{9(1+y)^3}$

8. $-9^{3/2}$

9. $3^z \cdot 3^{2z}$

10. $\left(\dfrac{x^{-3}y^4}{5}\right)^{-3}$

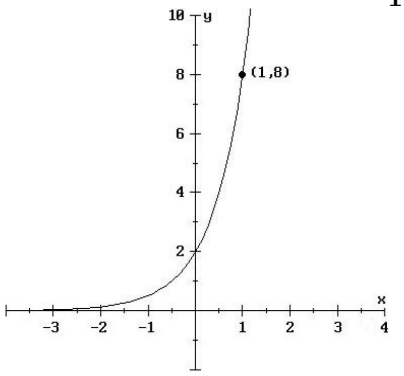
11. $\left(2n^3m^{-1}\right)^2(3nm)^0$

12. $\dfrac{2a^{n+1}}{a^{2n-1}}$

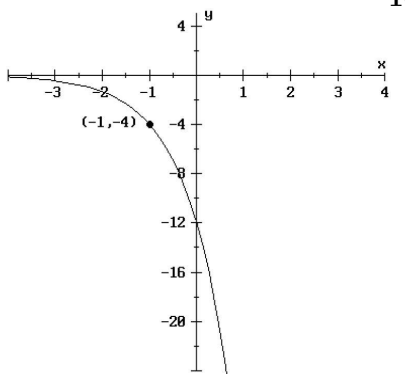
13. $\dfrac{ab}{a^{-1}+b^{-1}}$

Determine a function in the form $f(x) = k \cdot b^x$ for each of the graphs shown below.

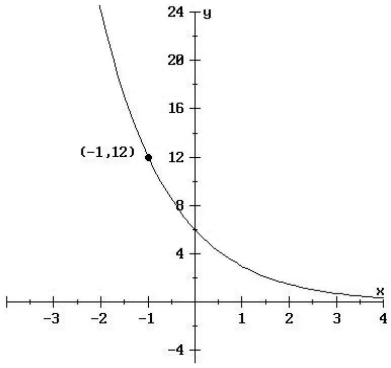
14.



15.



16.



Determine a function of the form $f(x) = k \cdot b^x$, whose graph passes the indicated points.

17. $(0, 2)$ and $(4, 8)$

18. $(1, 12)$ and $(3, 192)$

19. Determine whether the following statements are true or false.

a) $\left(3x^2y\right)^4 = 3x^8y^4$

b) $\sqrt[3]{t^4} = t^{3/4}$

c) $x^{mn} = (x^n)^m$

d) $2^{-2} = -4$

e) $\dfrac{1}{x^{-1}+y^{-1}} = x + y$

f) $\dfrac{c^{3/2}}{d^{1/2}} = \sqrt{\dfrac{c^3}{d}}$

g) $\dfrac{1}{3x} = 3x^{-1}$

h) $7\left(a^2-b\right)^{-1/2} = \dfrac{7}{\sqrt{a^2-b}}$

i) $x^{1/3} = \dfrac{1}{x^3}$

j) $\left(2x^2-8\right)^3 = 8\left(x^2-4\right)^3$

k) $\sqrt[3]{-64}$ is undefined