Chapter 9 Review Extra Practice

STUDENT BOOK PAGES 575–577

1. If $f = \{(-11, 7), (-7, -6), (-2, 16), (1, 3), (8, 13), (9, 4)\}$ and $g = \{(-11, -2), (-8, 5), (-7, 3), (-2, 1), (2, 12), (8, 6)\}$, evaluate each of the following expressions.

a) $f + g$
b) $f - g$
c) $g + f$
d) $g - f$
e) $f - f$
f) $g + g$

2. For each of the following pairs of functions, determine $(f \times g)(x)$.

a) $f(x) = 4x - 1; g(x) = x + 9$
b) $f(x) = \sqrt{32x^3}; g(x) = \sqrt{2x^5}$
c) $f(x) = 9 \sin x; g(x) = 3 \sec x$
d) $f(x) = \frac{x^2}{4}; g(x) = \frac{96}{x}$
e) $f(x) = x - 75; g(x) = 75 - x$
f) $f(x) = 18^x; g(x) = 18^{3x}$

3. For each of the following pairs of functions, determine $(f \div g)(x)$.

a) $f(x) = 6x^2 - 26x + 24; g(x) = 2x - 6$
b) $f(x) = 21 \cos x; g(x) = 3 \sin x$
c) $f(x) = 12x^2; g(x) = \frac{2}{x^2}$
d) $f(x) = 7x - 8; g(x) = \sqrt{7x - 8}$
e) $f(x) = 25^x; g(x) = 5^x$
f) $f(x) = x - 11; g(x) = 2x^2 - 19x - 33$

4. If $f(x) = 6x + 1$ and $g(x) = \frac{3x^2}{4}$, evaluate each of the following expressions.

a) $f(g(-3))$
b) $g(f(4))$
c) $(f \circ g)\left(\frac{1}{4}\right)$
d) $(g \circ f)(0)$
e) $(f \circ f^{-1})\left(-\frac{3}{4}\right)$
f) $(g \circ f^{-1})(5)$

5. For each of the following sets of functions, determine the domain and range of $f \circ g$ and $g \circ f$.

a) $f(x) = x^2 - 25; g(x) = \cos x$
b) $f(x) = \log(x - 9); g(x) = \frac{3}{2x}$
c) $f(x) = \sin x; g(x) = 5x^6$
d) $f(x) = 9 - x; g(x) = \frac{(3x + 7)}{(x + 4)}$
e) $f(x) = 10x + 3; g(x) = \cos^3 x$
f) $f(x) = \frac{1}{14^x}; g(x) = 14x^2$

6. Solve each of the following equations using graphing technology. Express each answer to the nearest tenth.

a) $16 \tan^2 x = -x^2 + 3x + 2$
b) $\frac{100}{x^3} = \log(8x)$
c) $22^x = x^{22}$
d) $9x + 8 = \sin^3 x$
e) $\frac{1}{10x - 7} = \log(7 - 10x) - 3$
f) $6x^2 - 11x - 2 = 11^x$

7. A country expects the growth of its population to follow an exponential model in the form $P(t) = a(b)^t$, where $P(t)$ is the size of its population at a given time and t is the number of years from now. The country currently has a population of 20 000 000 people, and in 12 years, it expects its population to grow to 38 000 000 people.

a) Sketch a graph showing the country's population as a function of time in years.
b) Determine an equation that models the country's population as a function of time in years. Round b to four decimal places.
c) After how many years will the country have three times the population it has now? Round your answer to two decimal places, if necessary.
d) What is the average rate of change in population that the country expects during the next 16 years? Round your answer to the nearest whole number, if necessary.