4.6 WS 2

1. The population of a city grows exponentially according to the function $f(t) = 12,400(1.14)^t$ for $0 \le t \le 5$ years. Find, to the nearest hundred, the population of the city when t is:
   a. $t = 3$ years
   b. $t = 4.25$ years

2. A city had a population of 53,700 in 2008 and a population of 58,100 in 2012.
   a. Find the exponential growth function for the city. Use $t = 0$ to represent 2008.
   b. Use the growth function to predict the population of the city in 2020. Round to the nearest hundred.

3. Estimate the percentage of polonium (^{210}Po) that remains in a sample after 2 years. Round to the nearest hundredth of the percent.

4. The Rhind papyrus, named after A. Henry Rhind, contains most of what we know today of ancient Egyptian mathematics. A chemical analysis of a smaple from the papyrus has shown that it contains approximately 75% of its original carbon-14. Estimate the age of the Rhind papyrus.

5. Find the balance if $17,500 is invested at an annual interest rate of 3.25%, compounded annually, for
   a. 7 years
   b. 15 years

6. How long with it take to double your money if it is invested in a certificate of deposit that pays 2.0% annual interest compounded daily? Round to the nearest tenth of a year.

Solve the following equations. Be sure to check your answers.

7. $8^x = 1000$

8. $\log(x+2) = \log 7 + \log x$

9. $\ln(x+7) - 2\ln 5 = 0.9$

10. $\log x + \log(x+3) = 1$

11. $5^{x+2} = 4$

12. $10e^{-0.05x} = 0.1$

Find the inverse of each function, then state the domain and range of $f^{-1}(x)$.

13. $f(x) = 7x + 21$

14. $f(x) = \sqrt[3]{x+10}$

15. $f(x) = \dfrac{4}{13-x}$

Write each equation in its exponential form.

16. $2 = \log_4 16$

17. $-3 = \log \dfrac{1}{1,000}$

18. $\ln x = 10$

19. $\log_3(x+8) = 4$

Write each equation in its logarithmic form. Assume $y > 0$ and $b > 0$.

20. $8^2 = 64$

21. $5^3 = 125$

22. $71.11 = e^{4.25}$

23. $e^{-2} = (2-x)$