Chapter 4
Section 4.4

Solving Logarithmic Equations: We will use all of our rules of logarithms in order to solve equations involving a logarithm.
Ex: Solve $log(x) + log(x+2) = log(6x+1)$

Grp Ex: Solve $a)log(x-3) = 4$,
$b)log(x) - log(x-1) = 2$ and
$c)2 \cdot ln(x) = ln(x+3) + ln(x-1)$

Solving Exponential Equations: We will also use the fact the logarithms and exponentials are inverses to solve exponential equations.
Ex: Find an exact answer for $6^x = 7^{x-1}$

Grp Ex: Find the exact solutions to $a)(1.02)^{4t-1} = 5$ and
$b)3^{2x-1} = 5^x$

Radioactive Dating: It has been found that the amount A of a radioactive substance remaining after t years is given by

$$A = A_0 e^{rt}$$

where A_0 is the initial amount present and r is the annual rate of decay. A standard measurement of the speed of decay is half-life. We can use this formula to determine the age of ancient rocks using a method known as potassium-argon dating.

Ex: There was a recent dinosaur find in Utah. Paleontologists want to estimate the age of the sauropods (type of dinosaur) by dating the volcanic debris in the surrounding rock using potassium-argon dating. The half-life of potassium-40 is 1.31 billion years. If 92.4% of the original amount of potassium-40 is still present in the rock, the how old is the rock?

Newton's Model for Cooling: Newton found that when a cold object is surrounded by a hot object the difference between them decreases exponentially according to the formula

$$D = D_0 e^{kt}$$

where D_0 is the initial difference, k is a constant according to the objects and t is time.

Ex: A turkey with temperature of $40°F$ is moved to a $350°F$ oven. After 4 hours the internal temperature of the turkey is $170°F$. If the turkey is done when the temperature reaches $185°F$, then how much longer must it cook?

Practice: 5, 11, 21, 29, 40, 44, 48, 52, 56, 85