Section 2.4: Exponential Functions

<u>Basic forms:</u> Form 1: $y = b^x$ where $b > 0$ and $b \neq 1$ Form 2: $y = e^{kx}$

<u>Exponential Rules:</u> $a^x a^y = a^{x+y}$ $(a^x)^y = a^{xy}$ $\frac{a^x}{a^y} = a^{x-y}$ $(ab)^x = a^x b^x$

Example: Solve for x. Give exact answers.

A) $10^{2+3x} = 100^{5x+6}$

B) $\dfrac{9^x}{3^{x+1}} = 27$

C) $x^2 6^{3x} = 6^{3x}$

<u>Compound interest:</u> $A = P\left(1 + \frac{r}{m}\right)^{mt}$

   r = interest rate   m = compounding style   t = time in years
   A = future value   P = amount invested(present value)

Example: How much would you have in the bank after 2 years if you invest $3000 at 5.25% compounded quarterly?

Example: What do you invest now to have $7000 in 4 years if the account earns 6.5% compounded monthly?

<u>Growth/Decay applications:</u> $y = c * e^{kx}$ growth when $k > 0$, decay when $k < 0$

Example: The population of a town grows continuously at a growth rate of 7.2%. If the town has a current population of 50 thousand people, what will be the population in 3 years?

Example: How long will it take the population of the town to double?