Math 70
Unit 2 and 3 exam Review

Question. *What is an exponent?*

Write down all of the rules for exponents that you know and prove them:

Simplify :

(1) $(-1)^4$

(2) $\dfrac{10^3}{10^{20}}$

(3) $(-2ab^2)^3$

(4) $(2a^2b^{-1})^4$

(5) $\left(\dfrac{-5a^3}{a^2}\right)^4$

Express the following in decimal form :

$-10^4 + 10^5$

$3 \cdot 10^3 + 8 \cdot 10^2 + 2 \cdot 10^{-1}$

Convert to Scientific Notation: 50 billion divided by 100 thousand

Question. *What is a logarithm ?*

Write out all of the properties of logarithms that you know :

Simplify the following expressions by hand knowing that $\log(2) \approx 0.7$

(1) $\log \frac{20}{10}$

(2) $\log(8)$

(3) $\log(400)$

(4) $\log \frac{1}{40}$

Expand the following:
$\log(\sqrt{xy})$
$\log \frac{x^2}{7}$

Question. *What is the general form of an exponential function?*

Question. *What is the difference between an exponential growth function and an exponential decay function?*

For the following situations create an appropriate exponential function:

We start with 100 bacteria cells in a dish. They triple every hour. How many do we have at the end of 24 hours?

In 1910 the U.S. population was 92,407,000. Assume that it increases on average 1.5% a year. What is the doubling time of the population. Using your equation, how large should the population be in 2013. Does your prediction match the actual current population? What can you infer by the difference if any?

Question. *What is the general form of an equation that models the interest compounded n times a year on a principal investment of P_0 dollars at an annual rate (APR) of r?*

Question. *What is the equation that model continuous compounding of interest at an APR of r on a P_0 principal*

Designate $\log_e(x) = \ln x$. Verify that all of the usual logarithm rules apply to the *natural log* , $\ln x$.

Suppose that $15,000 was invested on our behalf at a continuously compounded rate. At the end of 3 years we have $ 19,020. What is the annual percentage rate on this investment? What is the effective annual rate (AYR) ?