Review for Final Exam - Part I

1 Exponential and Logarithmic Functions

1.1 Understanding Exponential Functions

1.1.1 Example

A bacteria culture starts out with 200 bacteria and doubles every 5 hours. How many bacteria will there be after 7 hours?

1.1.2 Example

The half life of some chemical element is 15 days. How much of a 25-gram sample of this element is left after one year?

1.2 Compound Interest

1.2.1 Example

Suppose you invest $\$20,000$ in an account that earns 5% interest compounded monthly. How much money will you have in 2 years?

1.3 Logarithms

1.3.1 Example

Convert the exponential statement to a logarithmic statement.

(a) $5^4 = 625$

(b) $10^{-2} = \dfrac{1}{100}$

(c) $e^3 \approx 20.0855369$

1.3.2 Example

Convert the logarithmic statement to an exponential statement.

(a) $\log_4(4^7) = 7$

(b) $\log(100) = 2$

(c) $\ln(e) = 1$

1.3.3 Example

Find the domain of $f(x) = \log(x^2 + 5x + 6)$

1.3.4 Example

Simplify $e^{2x \ln(3)}$.

1.3.5 Example

Rewrite 3^x as e to a power.

1.3.6 Example

Use the properties of logarithms to express $\log\left(\frac{x^2\sqrt{y}}{z^4}\right)$ as a sum and/or difference of there logarithms.

1.3.7 Example

Use the properties of logarithms to write the expression using the fewest number of logarithms possible.

$$\ln(x^3 + 1) + \ln(x) + \ln(z) - 3\ln(y)$$

1.4 Solving Exponential and Logarithmic Equations

1.4.1 Example

Solve.

$$\ln(x + 4) = 7$$

1.4.2 Example

Solve. (**Remember to check you answer**)

$$\log_7(x - 4) + \log_7(x) = 2.$$

1.4.3 Example

Solve.

$$\frac{3^x + 5}{4} = 3$$

1.4.4 Example

Solve.

$$2^{x-3} = 5^{1-x}$$

1.4.5 Example

A bacteria doubles every 6 hours. How long until the culture triples?