MATH 117: Exam # 2

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Due: 11/6/2020 11:59pm
Don't forget to vote!

Please show your work for the following problems. These problems have solutions that are easily found online, so most of your grade will be based on your explanation. Good luck!

1

Assume r, n, P, A are constant. Solve for t in the compound interest formula:

$$A = P\left(1 + \frac{r}{n}\right)^{nt}.$$

Show you're work.

2

Assume that $a, b, c, d, e, f, g, h, k, l > 0$ are constants. Condense

$$a\log_b(c) + \log_d(e) + \frac{\log_f(g)}{h} + \log_j(k + l)$$

into a single logarithm with base b. Show you're work.

3

The formula for an increasing population is given by $P(t) = P_o e^{rt}$ where P_0 is the initial population and $r > 0$ is constant. Derive a general formula for the time t it takes for the population to increase by a factor of M. Show you're work. (Hint: We have done this when $M = 2$.)

4

Assume $P_0, D, P > 0$ is constant After D days a sample of radon-222 has decayed to $P_0\%$ of its original amount.

4.1

What is the half-life of radon-222, in terms of P_0 and D? (The half-life being the time it takes to decay to half of its original amount.) Answer should be in terms of P_0, D. Show you're work.

4.2

How long will it take the sample to decay to a percentage P of its original amount? Solve it in terms of P, P_0, D. Show you're work.

5

Solve the following exponential/logarithmic equations for x, in terms of the constants $A, B, C, D > 0$. Warning: Some of your answers will be complex (the imaginary kind of complex, and also possibly the difficult kind of complex). We'll being using the notation: $\log_{10}(x) = \log(x)$.

5.1

$$\frac{A}{B + Ce^{-x^2}} = D$$

5.2

$$\log(x + A) + \log(x + B) = 1$$

5.3

$$A^{x^2/2} = B^{x-1}.$$

Extra Credit

Solve for k in the equation

$$x^{1/\log(x)} = k.$$