Math102 Section 110

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Worksheet for Nov 23, 2017

1. Go over the problems that were on Quiz 3, and be sure you can do any that you got incorrect. (Solutions are posted on the Math 102 Section 101 wiki).

2. **Critical points Review:** Find the critical point(s) of the function $y = f(x) = Cx^B e^{-rx}$. Assume that all the constants, C, B, r are positive. This question is directly applicable to your CSP workshop this week.

3. Differential equations in biological modeling:

   (a) Explain the differential equations (13.13) a, b for the spread of an infection.

   (b) Show that the population $I + S = N$ is constant and use this to reduce these equations to a differential equation that involves only the infected class.

   $$\frac{dI}{dt} = \beta I(K - I)$$

   How is the constant K related to the total population N and to the parameters μ and β?

   (c) Analyze the behaviour of this DE for both positive and negative values of K.

   (d) Suppose an infectious disease has approximate duration of 10 days and transmission rate 0.001 per person per day. What is the smallest size N of a population in which this disease could become endemic?

4. **Optimization Review:**

   (See `http://wiki.ubc.ca/Course:MATH102/Question_Challenge`) Problem 2010 December Q7

5. **Trigonometric Related Rates 1:**

   (See `http://wiki.ubc.ca/Course:MATH102/Question_Challenge`) Problem 2000 December Q9 The cycloid curve.

6. **Trigonometric Related Rates 2:**

   (See `http://wiki.ubc.ca/Course:MATH102/Question_Challenge`) Problem 2001 December Q8 The cycloid curve.