Quiz 5

Math 1030-006
11/05/04
Name: _________________________________

Read all of the following information before starting the exam:

• The last page of the quiz has a table of formulas.

• Show all work, clearly and in order, if you want to get full credit. I reserve the right to
  take off points if I cannot see how you arrived at your answer (even if your final answer is
correct).

• Justify your answers algebraically whenever possible to ensure full credit. When you do
  use your calculator, sketch all relevant graphs and explain all relevant mathematics.

• Circle or otherwise indicate your final answers.

• Please keep your written answers brief; be clear and to the point. I will take points off for
  rambling and for incorrect or irrelevant statements.

• Be sure to round correctly.

• This test has 5 problems and is worth 25 points, plus one extra credit at the end. It is
  your responsibility to make sure that you have all of the pages!

• Good luck!
1. (5 points) A community of rabbits begins with an initial population of 100 and grows 3.5% per month. Find a doubling time using any of the methods discussed in class as long as it makes sense.

2. (4 points) This month I over spent by $2500. Now I owe $2550 to my credit card and I have $8220 is student loans.
   a. (2 pts) How much is my debt?

   b. (2 pts) How much is my deficit for the month?
3. (5 points) The following questions involve sound. Use $dB = 10\log \left( \frac{I}{I_o} \right)$ where $I$ is the intensity of the sound and $I_o$ is the intensity of the softest audible sound or a reference sound as the case may be. Also use the inverse square law for sound ($\sim \frac{1}{r^2}$).

a. (3 pts) How many times louder is a 35-dB sound than a 10-dB sound?

b. (2 pts) You don’t like the 35-dB sound and would like it to be less loud. You are standing 2m away from it. How far away from it should you be from it so that it is $\frac{1}{8}$ as loud?
4. (6 points) Gene is single and had a taxable income of $35,400. Use the table to calculate the tax owed.

<table>
<thead>
<tr>
<th>Tax Rate</th>
<th>Single</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>up to $7000</td>
</tr>
<tr>
<td>15%</td>
<td>$7001 to $28,400</td>
</tr>
<tr>
<td>25%</td>
<td>$28,401 to $68,800</td>
</tr>
<tr>
<td>28%</td>
<td>24 $68,801 to $143,500</td>
</tr>
<tr>
<td>33%</td>
<td>$143,501 to $311,950</td>
</tr>
<tr>
<td>35%</td>
<td>$311,951 or more</td>
</tr>
<tr>
<td>Standard Deduction</td>
<td>$4750</td>
</tr>
<tr>
<td>Exemptions (per person)</td>
<td>$3050</td>
</tr>
</tbody>
</table>

5. (5 points) Using the fact that log 3 = .477 find log (10/3). Do not use a calculator. Show every step. There will be no credit given for a final answer without work to show it.
Bonus Question (1 Extra Credit Point):

BONUS QUESTION
How many dB is complete silence (meaning a sound of intensity 0)?
Cheat Sheet of Formulae

Approximation for doubling and halving time (the rule of 70).

\[ T_D = \frac{70}{P} \]

\[ T_H = \frac{70}{P} \]

Exact doubling and halving time

\[ T_D = \frac{\log 2}{\log (1 + r)} \]

\[ T_H = -\frac{\log 2}{\log (1 + r)} \]

Decibels

\[ dB = 10 \log \left( \frac{I}{I_o} \right) \]

Leave any comments or concerns that you have for me on this page. Tear this page off and turn it in separately so that your comments can be anonymous and honest.