Math 189 – Test #2

May 19, 2015   **Name:** _____
Instructor: Patricia Wrean

Total: 25 points

1. State the form of the particular solution y_p for the following. Leave your answer with undetermined coefficients. (This means "Write down your initial guess for y_p but don't bother to solve for the constants.") Please note that the complementary solution for the homogeneous equation is $y_c = C_1 + C_2 e^{6x}$.   (3 points)

   a) $y'' - 6y' = 1 - 5e^{-x}$ _____

   b) $y'' - 6y' = -3\cos x$ _____

2. Consider the following variables concerning a car.   (2 points)

   a) the year it was built

   b) the name of the manufacturer

   c) the gas mileage

   d) the colour

        Which of these are quantitative?   _____

        From the quantitive data, which are continuous?   _____

3. According to the Vancouver Canucks' website (www.canucks.com), the number of goals scored by their top ten scorers in a past year are as follows: (5 points)

<center>36, 24, 23, 20, 18, 14, 12, 12, 12, 11.</center>

a) State the mean, median, and range of this data set.

<div align="right">

mean: _____

median: _____

range: _____

</div>

b) Suppose that in the next game or games, the highest and lowest numbers of goals (36 and 11) each increased by two while all of the other data points stayed the same. What would happen to the median and the range? Be as specific as you can!

4. Consider the following sets of data. Without calculating any values, indicate which set will have the higher standard deviation (or will they be the same?).   (2 points)

a) Set 1: 1, 3, 5, 7, 9   Set 2: 1, 2, 3, 4, 5

b) Set 1: 1, 3, 5, 7, 9   Set 2: 11, 13, 15, 17, 19

c) Set 1: 1, 4, 5, 6, 9   Set 2: 3, 4, 5, 6, 7

d) Set 1: 22, 23, 24, 25, 26   Set 2: 15, 20, 25, 30, 35

5. A set of data has a mean of 75 and a standard deviation of 5. After looking at the relative frequency histogram, you know that this is a more-or-less symmetric, mound-shaped distribution.   (4 points)

   a) What can you <u>estimate</u> about the proportion of measurements that fall between 65 and 85?

   b) What can you say <u>with certainty</u> about the proportion of measurements that fall between 65 and 85?

   c) Tchebysheff says that at least 50% of the data will fall between the values x and y. Calculate those values.

6. Solve: $\qquad\qquad\qquad y'' + 2y' - 3y = 2 + 12e^{-3x}.$ $\qquad\qquad\qquad$ (5 points)

$$y'' + 2y' - 3y = 2 + 12e^{-3x}.$$ (5 points)

7. A 0.50 kg mass is suspended from a spring with spring constant k = 12.5 N/m. The mass moves up and down according to the following differential equation, where y is the height of the block (in cm) above its equilibrium position.

$$m\frac{d^2y}{dt^2}+ky=0$$

A student taps the mass so that it starts at the equilibrium position with an initial speed of 1.5 m/s downward. Find the distance y as a function of the time elapsed after the initial tap.   (4 points)