Math 189 – Assignment #2

Name: _____

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 $y_c = C_1 e^{2x} + C_2 e^{3x}$.

   a) $y'' - 5y' + 6y = 4x^2 - 3$ _____

   b) $y'' - 5y' + 6y = x^2 e^{-7x}$ _____

   c) $y'' - 5y' + 6y = e^x \sin x$ _____

   d) $y'' - 5y' + 6y = 2 + e^{3x}$ _____

2. Solve $y'' + 4y' = -4(y + 2x)$.

3. Solve the following differential equation.

$$y'' + 4y' - 21y = 5e^{2x}$$

if when $x = 0$, $y = -\dfrac{5}{9}$ and $y' = -\dfrac{1}{9}$

4. A block of wood is floating in oil. A student pushes the block down 3 cm into the oil and holds it there at rest. Once the student lets go, the block then bobs up and down such that its equation of motion is $4\dfrac{d^2y}{dt^2} + 4\dfrac{dy}{dt} + 17y = 0$, where y is the height of the block above its equilibrium position (in cm).

   a) Find the height y as a function of the time elapsed after the student lets go.

   b) Calculate the block's position after 1 seconds, 2 seconds, and 3 seconds have elapsed.

5. Consider the following variables.

    a) number of grains of sand in your shoes

    b) time spent by Math 254 students on computer games per week

    c) weight of the various chocolate bars in a vending machine

    d) brand names of chocolate bars in a vending machine

    Which of these are quantitative?   _____

    From the quantitive data, which are continuous?   _____

6. The Gizmo Store is having a sale of its Bluetooth-enabled widgets which range in
    price from $25 to $75. Answer the following questions, <u>being as specific as you can</u>!

    a) If every widget is reduced in price by $10, what happens to the mean, median,
        range, and standard deviation of the widget prices?

    b) If, instead, the most expensive widget is reduced in price by $10, what happens to
        the mean, median, range, and standard deviation of the widget prices?

    c) If, instead, every widget is reduced in price by 10%, what happens to the mean,
        median, range, and standard deviation of the widget prices?

7. A random sample of Technology students were asked how many hours they worked last week while on their co-op term, with the following results.

$$31, 42, 38, 26, 29, 29, 32, 35, 36, 37, 32, 30, 27, 43, 48, 30, 32, 33, 35, 39$$

The mean and standard deviation of this data are 34.2 and 5.7 hours/week, respectively. The histogram for this data is shown below.

a) Describe the shape and symmetry of the histogram.

b) Find the percentage of measurements in the intervals $\bar{x} \pm s$, $\bar{x} \pm 2s$, $\bar{x} \pm 3s$ and fill out the following table. In your table, also state what percentages you expect to see in these intervals using either Tchebysheff or the Empirical Rule.

	interval	# of points	% of points	Empirical	Tchebysheff
$\bar{x} \pm s$					
$\bar{x} \pm 2s$					
$\bar{x} \pm 3s$					

c) Do the percentages obtained in part b) agree with those given by the Empirical Rule? By Tchebysheff? Should they?

8. A set of data has a mean of 42 and a standard deviation of 8. What can you say about the proportion of measurements that lie above 58,

   a) if you know absolutely nothing about the shape of the distribution?

   b) if you know that the distribution is bimodal but perfectly symmetrical?

   c) if instead you know that the distribution is unimodal and beautifully symmetrical?