Lab Section 01 MATHEMATICS MATH*1080 Lab Quiz #1 W

NO CALCULATORS ALLOWED

Surname:_____ Initials:_____ Lab Section #_____
(PRINT)

Student #:_____ Class Section #_____

1. Assume that for a set of $n = 10$ data points (x_i, y_i) that exhibits a linear pattern, $\sum_{i=1}^{n} x_i = 20$, $\sum_{i=1}^{n} y_i = 120$, $\sum_{i=1}^{n} x_i^2 = 55$, and $\sum_{i=1}^{n} x_i y_i = 285$. Use the formula

$$nb + \left(\sum_{i=1}^{n} x_i\right)m = \left(\sum_{i=1}^{n} y_i\right)$$

$$\left(\sum_{i=1}^{n} x_i\right)b + \left(\sum_{i=1}^{n} x_i^2\right)m = \sum_{i=1}^{n} x_i y_i$$

to determine the Least Squares Line $y = mx + b$ that fits these data points.

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2. On joining a real estate firm, an employee must choose one of two salary options based on the monthly net profit. Let x denote the monthly net profit in dollars.
   Option A: The monthly salary $A(x)$ is \$1,600 plus 5% of the monthly net profits.
   Option B: The monthly salary $B(x)$ is \$1,800 plus 7% of the amount of the monthly net profit that is greater than \$40,000.
   For what monthly net profits is the monthly salary in Option B equal to the monthly salary in Option A?

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PLEASE TURN OVER

3. In an epidemic, assume that the number of people infected is a quadratic function of the number of days the epidemic has been running. If the epidemic lasts 100 days and infects 1500 people at its peak then find the quadratic model. Assume that at time t $=$ 0 the number of people infected is zero.

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4. When discovered, the temperature of a body was 26 °C and the ambient temperature was a constant 22 °C. The body was quickly taken to the morgue where the ambient temperature was maintained at 5 °C. After 2 hours the body temperature was found to be 19 °C. Note that the normal body temperature is 37 °C and the formula for the cooling of a body is given by $T(t) = T_A + (T_0 - T_A)e^{-kt}$. Determine the decay rate k of the body.

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5. A drug with a biological half-life of 10 hours has a decay rate of $k = -\frac{1}{10}ln(\frac{1}{2})$. How soon after an initial dose of 900 mg will the drug reach its minimum therapeutic value of 400 mg in the body?

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