**Solve for best fit with calculation of coefficient of determination the following problems:**

Prob. #1

The following Table P6.7 shows ages $x$ and systolic blood pressure $y$ of 12 men.

($a$) determine the least squares regression equation of $y$ on $x$

($b$) estimate the blood pressure of a man whose age is 45 years.

**Table P6.7**

| Age (x) | 56 | 42 | 72 | 36 | 63 | 47 | 55 | 49 | 38 | 42 | 68 | 60 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Blood pressure (y) | 147 | 125 | 160 | 118 | 149 | 128 | 150 | 145 | 115 | 140 | 152 | 155 |

Prob. #2

A car manufacturing company wanted to investigate how the price of one of its car models depreciates with age. The company took a sample of eight cars of this model and collected the following information on the ages (in years) and prices (in hundreds of dollars) of these cars as shown in Table P6.10.

**Table P6.10**

| Age | 8 | 3 | 6 | 9 | 2 | 5 | 6 | 3 |
|---|---|---|---|---|---|---|---|---|
| Price | 16 | 74 | 40 | 19 | 120 | 36 | 33 | 86 |

($a$) find the regression line $\hat{y} = a + bx$ with price as a dependent variable and age as independent variable

($b$) give a brief interpretation of the values of $a$ and $b$ calculated in part ($a$)

($c$) predict the price of a 7-year old car of this model

($d$) estimate the price of an 4-year old car of this model.

Prob. #3

The intensity of radiation of a radioactive substance was measured at half-year intervals. The results were:

| $t$ (years) | 0 | 0.5 | 1 | 1.5 | 2 | 2.5 |
|---|---|---|---|---|---|---|
| $\gamma$ | 1.000 | 0.994 | 0.990 | 0.985 | 0.979 | 0.977 |
| $t$ (years) | 3 | 3.5 | 4 | 4.5 | 5 | 5.5 |
| $\gamma$ | 0.972 | 0.969 | 0.967 | 0.960 | 0.956 | 0.952 |

where $\gamma$ is the relative intensity of radiation. Knowing that radioactivity decays exponentially with time: $\gamma(t) = ae^{-bt}$, estimate the radioactive half-life of the substance.

Prob. #4

Find the best values of a and b if the following data given are related by:

$$y = ax + bx^2$$

| | | | | | |
|---|---|---|---|---|---|
| x: 1 | 2 | 3 | 4 | 5 | 6 |
| y: 2.6 | 5.4 | 8.7 | 12.1 | 16 | 20.2 |

Prob. #5

The following pairs of values were found for potential difference V volts and the current A amperes in an electric circuit and are given below:

| | | | | |
|---|---|---|---|---|
| V: 50.3 | 47.3 | 46.8 | 45.1 | 43.6 |
| A: 1.96 | 2.98 | 3.96 | 5.96 | 9.57 |

Find the curve of the form V= a+b/A.

Prob. #6

The horse power I, required to drive the a ship of displacement D tons at a ten-knob speed as given by the table below, $\boldsymbol{I = AD^n}$ to fit the data:

| | | | |
|---|---|---|---|
| D: 1720 | 2300 | 3200 | 4100 |
| I: 655 | 789 | 1000 | 1164 |

Prob. #6

The following table gives the data collected in an experiment to study the relationship between the stopping distance $d(m)$_ of an automobile travelling at speeds $v$(km/hr) at the instant the danger is sighted.

($a$) fit a least-squares parabola of the form $d = a + bv + cv^2$ to the data

($b$) determine the coefficient of determination.

| Speed v(km/hr) | 32 | 48 | 64 | 80 | 96 | 112 |
|---|---|---|---|---|---|---|
| Stopping distance d(m) | 16.5 | 27.5 | 19.5 | 24.5 | 29.3 | 34.2 |

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