Statistics 20: Solutions to Quiz 1

1. (a) The point corresponding to Ithaca, NY is the lower most point on the scatterplot.

(b) Substituting the value of means, standard deviations and correlation in the given formulae, we obtain $b = -2.42$ and $a = 136.73$.

(c) $\hat{y} = a + b \times 41.9 = 35.33$.

(d) Residual $= 28.9 - \hat{y} = -6.43$.

(e) False. An increase in temperature will increase the mean (of temperatures) by an equal amount and therefore the correlation will remain unaffected. Remember that in the formulae for correlation, what appears is the difference between the individual values and the mean.

2. (a) Standard units corresponding to $X$ number of years is given by $SU(X) = \frac{(X - \mu)}{\sigma}$. Therefore $SU(9) = -1.2$ and $SU(14.5) = 1$.

(b) From table A, we observe that percentages on the left of $z = -1.2$ and $z = 1$ are 11.51 and 84.13 respectively. Therefore the percentage of engines having a life between 9 and 14.5 years is $(84.13 - 11.51) = 72.62$.

(c) Looking at table A, the $z$ value corresponding to 0.60 is 0.25 (this value actually corresponds to 0.5987 which is the closest approximation to 0.60 in the table). Finally to convert this $z$ into number of years, we multiply it by $\sigma$ and add $\mu$ to the resultant. Therefore the answer is $(0.25 \times \sigma + \mu) = 12.625$. 

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