

I) In MST 109 you get a B if you score anywhere between 83 and 87. Collecting the grades of all MST109 students in a certain year we notice that scores form approximately a normal distribution with mean $\mu = 78$, and standard deviation $\sigma = 12$.

a) Using the Normal distribution, find the percentage of the students that got B.

The area to the left of 83 $\cong 0.66$ We use excel (`=Norm.dist(83, 78,12,true)`)

The area to the left of 87 $\cong 0.77$

The area between 83 and 87 = $0.77-0.66 = 0.11$

Percentage of students who got a B is 11%

b) How much should your grade be to fall into the top 5 percentile of the class during that year.

Top 5% means that your score is higher than 95% of the class.

To calculate the score you can use the table to get the z-score and then transfer the z -score into the actual score, or using excel (`=Norm.inv(0.95,78,12)`) you will get that the score is $\cong 97.74$

II) Find the mean and the standard deviation of a normal distribution where 75% of its population fall under the value 90 and its mean μ and standard deviation σ satisfy the equation $\mu = 85 + \sigma$.

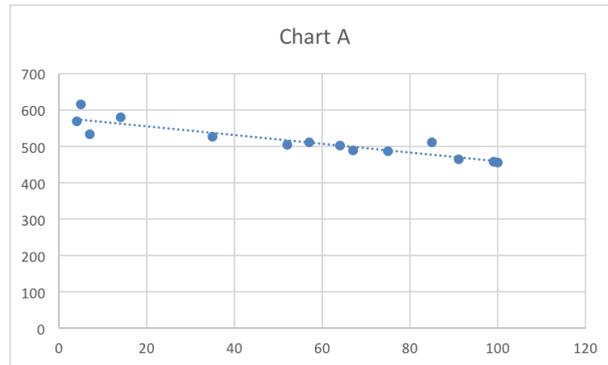
Using the table we get that the z-score for 0.75 = 0.67

$$\begin{aligned} \text{Hence } 0.67 &= \frac{90 - \mu}{\sigma} \\ &= \frac{90 - (85 + \sigma)}{\sigma} \end{aligned}$$

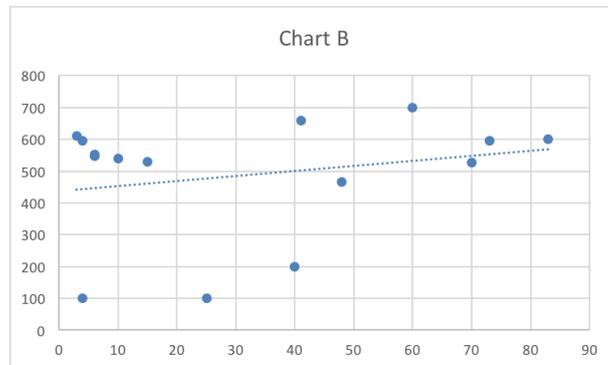
Solving the above equatoin in σ yields that $\sigma = 2.99$ and $\mu = 87.99$.

III) Consider the following 3 scatter plots. The correlations values for those charts are given by $r_1 = 0.24$, $r_2 = -0.9$ and $r_3 = 0.87$.

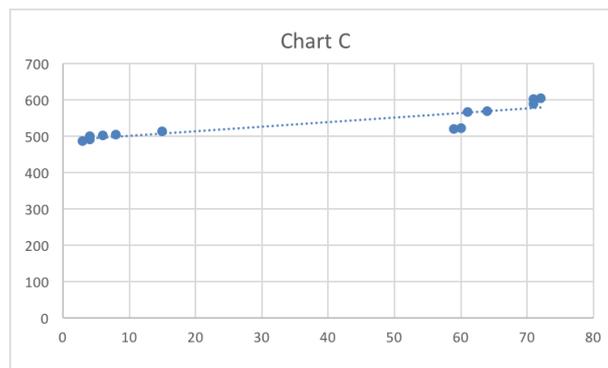
a) Match each of these correlation values to the appropriate scatter plot given bellow.



Correlation of Chart A is : $r_2 = -0.9$. The association is negative.



Correlation of Chart B is : $r_1 = 0.24$. The association is positive.



Correlation of Chart C is : $r_3 = 0.87$. The association is positive.

b) For each of the scatter charts above mention if the association is positive or negative.
 Answered above under each graph.