# <u>Answer key for example 1</u>

Julie got a mark of 80 from a math class with a mean of 85 and a standard deviation of 5, and her friend Andrea obtained 65 from a chemistry class with a mean of 55 and standard deviation of 10. Can you tell who got a "better" mark?

Julie:

Step 1: draw a bell shape graph of nonstandard normal distribution to incorporate the given information in the question
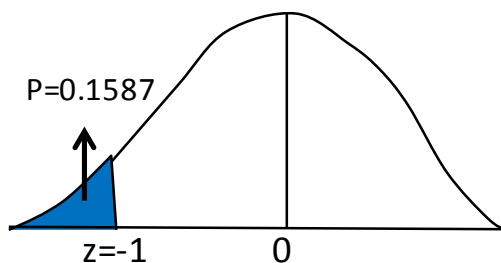

P

x=80   μ=85
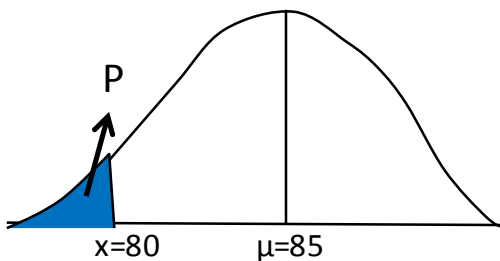
Nonstandard Normal Distribution

Step 2: convert x value (x=80) to z score by formula $z = \frac{x-\mu}{\sigma}$

$$z = \frac{x-\mu}{\sigma} = \frac{80-85}{5} = \frac{-5}{5} = -1$$

Step 3: Refer to Table A-2 and use z = -1 to find that the cumulative area to the left of z = -1 is an area of 0.1587 (P=15.87%).

Step 4: draw a bell shape graph of standard normal distribution
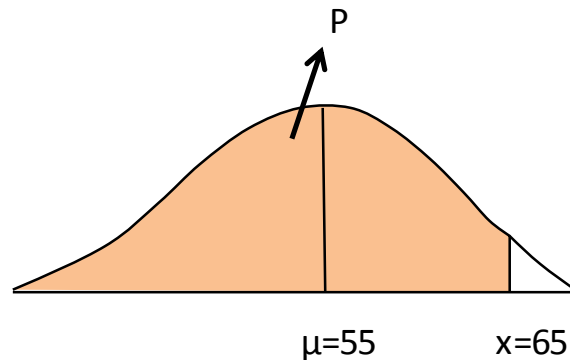

P=0.1587

z=-1   0

Standard Normal Distribution

Interpretation: Julie's mark of 80 is greater than 15.87% of the students' marks in her math class.

Andrea:
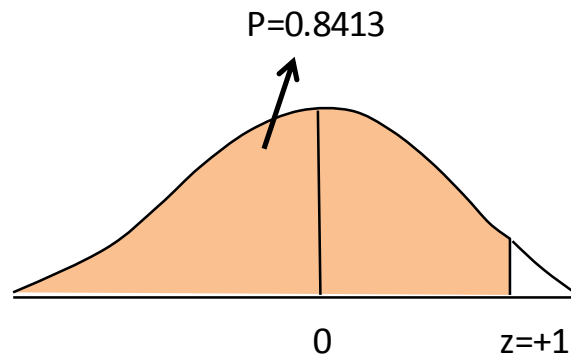
Step 1:

μ=55   x=65

Step 2: $z = \dfrac{x - \mu}{\sigma} = \dfrac{65 - 55}{10} = \dfrac{10}{10} = +1$

Step 3: Refer to Table A-2 and use z = +1 to find that the cumulative area to the left of z = +1 is an area of 0.8413 (P=84.13%).

Step 4:

P=0.8413

0   z=+1

Interpretation: Andrea's mark is greater than 84.13% of the students' marks in her chemistry class.

Conclusion: Since Julie's z score (-1) < Andrea's z score (+1) or 0.1587 < 0.8413, Julie's math mark is better than Andrea's chemistry mark.

Note: Negative z score like the z score -1 for Julie's math mark indicates that the mark is lower than the mean (average mark). A positive z score like the z score +1 for Andrea's mark indicates that the mark is greater than the mean.

The greater the z score, the greater the cumulative area to the left of z score is and the better mark it is.