

*A.M.D.G.*

Formulae: z-scores  $z = \frac{x - \mu}{\sigma}$  or  $z = \frac{\text{value} - \text{mean}}{\text{standard deviation}}$

- 1) In 2017, the mean score for the math section of the SAT for California students was 524 with a standard deviation of 103, and the distribution is approximately normal. Use that to find the z-score for each of the following.

a. SAT Math score of 580

d. SAT Math score of 380

b. SAT Math score of 740

e. SAT Math score of 420

c. SAT Math score of 670

f. SAT Math score of 520

- 2) In 2017, the mean score for the math section of the SAT for California students was 524 with a standard deviation of 103, and the distribution is approximately normal. Use your calculator to find the percentile rank for each of the following. (Remember, normalcdf is the distribution to use here).

a. SAT Math score of 580

d. SAT Math score of 380

b. SAT Math score of 740

e. SAT Math score of 420

c. SAT Math score of 670

f. SAT Math score of 520

- 3) The distribution of IQ scores is approximately normal, and the mean is 100 with a standard deviation of 15. Use that to answer each of the following:
- The cutoff for Mensa membership (as well as the cutoff for “genius” IQ) is 130. What are the  $z$ -score and percentile rank for this IQ score?

b) What are the  $z$ -score and percentile rank for an IQ score of 154?

- “High IQ” professions (doctors, lawyers, teachers, etc) have a mean IQ score of 108. How does the average “High IQ” professional compare to the general population described above? (that is, what is the  $z$ -score and percentile rank for an IQ of 108)

Fun Fact: IQ is **not** highly correlated with success past a value of 108. A slightly higher than average IQ correlates with success, but simply having a high IQ does not correlate with success much at all.

- Suppose you know that your percentile rank is the 87<sup>th</sup> percentile on a certain standardized test. If you know that the mean score is 21 and the standard deviation is 5 and it is a normal distribution, what did you score on this test?

- 5) Suppose you know that your percentile rank is the 44<sup>th</sup> percentile for height. If you know that the population is approximately normal and the mean height is 64.5 inches and the standard deviation is 2.5 inches, how tall are you?
- 6) Suppose you know that your percentile rank is the 99.5<sup>th</sup> percentile for height. If you know that the population is approximately normal and the mean height is 64.5 inches and the standard deviation is 2.5 inches, how tall are you?
- 7) Suppose you know that you are the 15<sup>th</sup> percentile for height and that heights are normally distributed. If the mean height is 70 inches and your height is 67.9 inches, what is the standard deviation?
- 8) Suppose you know that you are the 99<sup>th</sup> percentile for height and that heights are normally distributed. If the mean height is 70 inches and your height is 74.7 inches, what is the standard deviation?