

Section 5.3 - Normal Distributions: Finding Values

1. What if you are given a probability and want to find a value?
(i.e. What score can you receive on an exam and still be in the top 10%?)
2. Example #1: Using a normal table backwards.
 - (a) Find the z -score for which 68% of the distribution's area lies between z and $-z$.
 - (b) Find the z -score that has 74.22% of the distribution's area to the left.
 - (c) Find the z -score that has 74.22% of the distribution's area to the left.
 - (d) Find the z -score that corresponds to the percentile P_{25} .
3. Transforming $z = \frac{x - \mu}{\sigma}$, we get $x = z\sigma + \mu$. (Unstandardizing)
4. Example #2:
The SAT math scores among high school seniors in a recent year were normally distributed with mean 440 and standard deviation 60.
 - (a) Find the raw score (x) of a student whose z -score was 0.
 - (b) Find the raw score (x) of a student whose z -score was 1.833.
5. Backward Normal calculations (Finding a value given a proportion)
 - (a) Use normal table backward to find the proportion in the table body and read the corresponding z value from the left column and top row.
 - (b) Unstandardize to get the observed value.
6. Example #3:
The length of human pregnancies from conception to birth varies according to a distributions that is approximately normal with mean 266 days and standard deviation 16 days.
 - (a) Between what values do the lengths of the middle 99.7% of all pregnancies fall?
 - (b) How long is a pregnancy that falls into the 13.57 percentile?
 - (c) What is the length of the longest 16% of all human pregnancies?
7. Example #4:
Suppose that the average height for adult males is normally distributed with a mean of 70 inches and a standard deviation of 2.5 inches.
 - (a) Into what percentile does a man who is 68 inches fall?
 - (b) Into what percentile does a man who is 73 inches fall?
 - (c) What proportion of men is shorter than 74 inches?
 - (d) What percentage of men are taller than 76 inches?
 - (e) How tall is a man in the 13th percentile?
 - (f) How tall is a man who is shorter than 10% of all men?
 - (g) Determine the percentage of men falling between 68 and 75 inches.