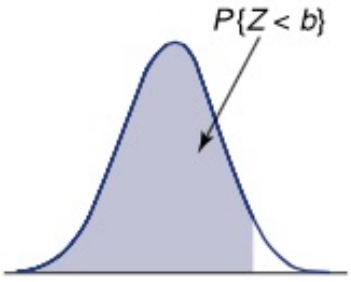
Class #26 - Wednesday, May 11

Section 6.4: Computing Probabilties for (Standard) Normal Random Variables

Cumulative Probability

$P(Z < b)$ = the area under the standard normal curve to the left of b:



Spreadsheet commands:

- For standard normal $Z \sim N(0,1)$: `=normsdist(b)` returns the cumulative probability for a standard normal random variable, i.e., the spreadsheet command returns $P(Z < b)$
- For $X \sim N(\mu, \sigma)$: `=normdist(b, μ, σ, true)` returns the cumulative probability for a normal random variable with the given mean and standard deviation, i.e., the spreadsheet command returns $P(X < b)$
- The standard normal (cumulative) probabilities can also be found using a table (as described in the textbook–see Fig 6.1)

Example 1:

- Calculate $P(Z < 0)$, $P(Z < 1)$, and $P(Z < -1)$ using `=normsdist`.
- Last time (and on the HW) we looked at an example where the blood pressure of adults is normally distributed with mean 128.4 and standard deviation 19.6 (i.e., $X \sim (128.4, 19.6)$. Use `=normdist` to compute the proportion of adults with blood pressure below 140.

We can use $P(Z < b)$ (and thus `=normsdist`) to calculate $P(Z > b)$ and $P(a < Z < b)$:

- $P(Z > b) = 1 - P(Z < b)$

  spreadsheet: `=1-normsdist(b)`

- $P(a < Z < b) = P(Z < b) - P(Z < a)$

  spreadsheet: `=normdist(b)-normdist(a)`

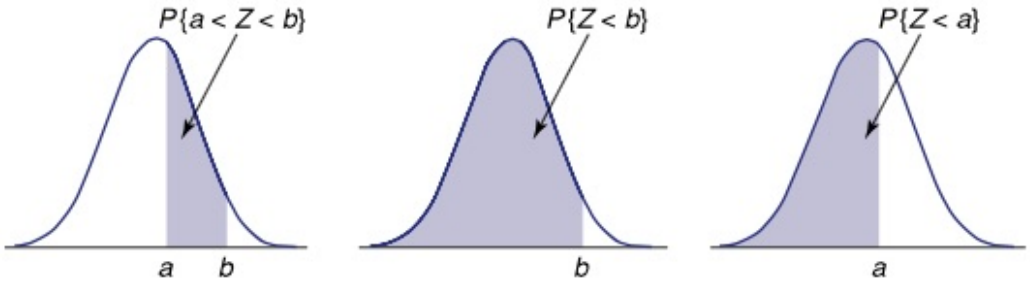


FIGURE 6.8
$P\{a < Z < b\} = P\{Z < b\} - P\{Z < a\}$.

Example 2: Calculate $P(Z > 0.8)$ and $P(-1.5 < Z < 2.5)$ using `=normsdist`.

We can also use the symmetry of the normal distribution to calculate $P(Z > b)$, since $P(Z > b) = P(Z < -b)$:

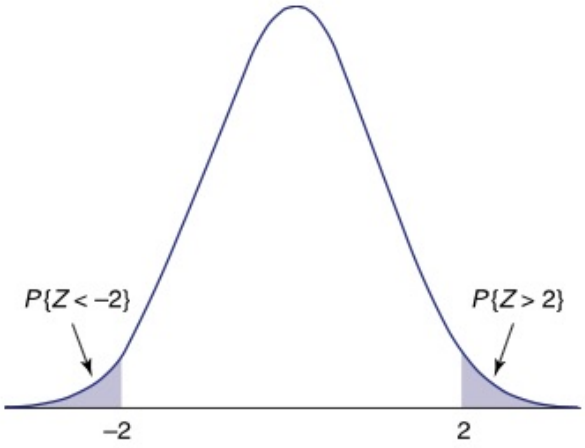


FIGURE 6.7
$P\{Z < -2\} = P\{Z > 2\}$.