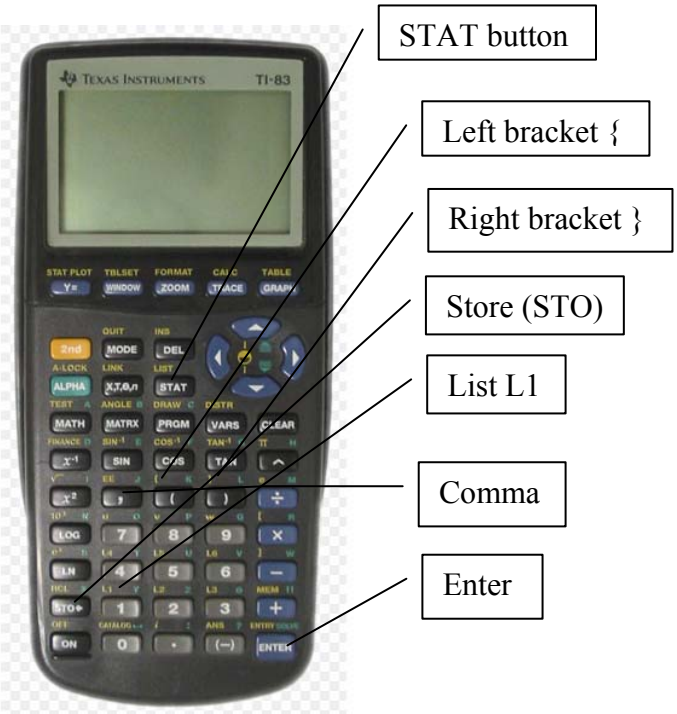
Stats on the TI 83 and TI 84 Calculator

Entering the sample values



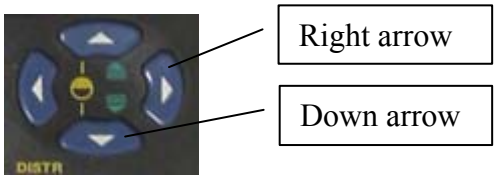
Example: Sample data are {5, 10, 15, 20}

1. Press "2ND" and Left bracket button.
2. Enter 5, press the comma button.
3. Enter 10, press the comma button.
4. Enter 15, press the comma button.
5. Enter 20, press "2ND" and Right bracket button.
6. Press the Store button.
7. Press "2ND" and the L1 button.
8. Press the ENTER button.

The sample values are now stored in list L1.

Descriptive Statistics

1. Press the STAT button.
2. Press the right arrow to CALC.



3. Press the ENTER key to select **1-Var Stats** (one-variable statistics).
4. Press "2^{ND}" and the L1 key (to find the descriptive stats for the values in list L1).
5. Press the ENTER button.

You will see:

$\bar{x}$ = 12.5 (this is the sample mean)
Σx = 50 (this is the sum of the sample values)
Σx^2 = 750 (this is the sum of each sample value squared)
Sx = 6.455 (this is the sample standard deviation, s)
σx = 5.590 (this treats the four values you entered as a population. We will never use this value in DSCI 2710.)
n = 4 (this is the sample size - - the number of values you entered in list L1)

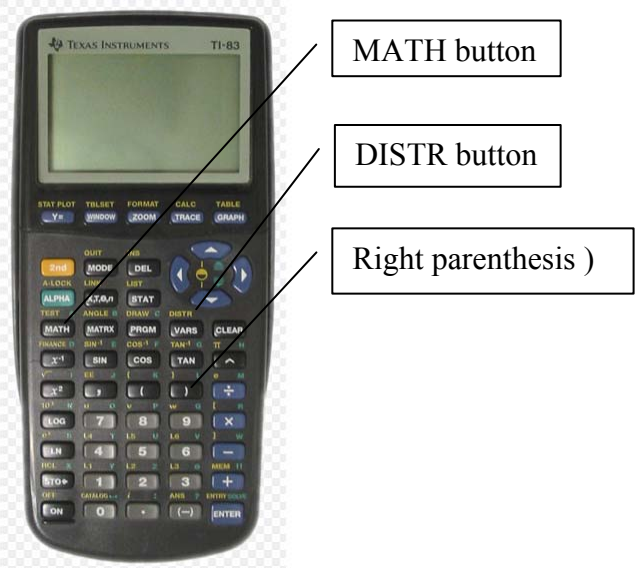
By repeatedly pressing the down arrow button, you will also see:

MinX = 5 (this is the minimum sample value)
Q_1 = 7.5 (this is the first quartile)
Med = 12.5 (this is the sample median and agrees with the textbook median definition)
Q_3 = 17.5 (this is the third quartile)
MaxX = 20 (this is the maximum sample value)

Finding combinations

Example: How many ways can you get 4 heads (and 6 tails) in 10 flips of a coin?

The answer is ${}_{10}C_4$. How to find:



1. Enter 10.
2. Press the MATH button and the right arrow button three times to get to PRB (probability).
3. Press the down arrow two times to get to nCr.
4. Press the ENTER button and then enter 4.
5. Press the ENTER button again and you should see the answer (210).

There are 210 ways of getting four heads and six tails in 10 flips of a coin.

Finding binomial probabilities

Example: What is the probability of getting 4 heads in 10 flips of a fair coin?

1. Press "2^{ND}" and the DISTR key (DISTR is an abbreviation of the word "distribution").
2. Press the down arrow until you get to the 10^{th} one. It is called binompdf(.
   ("pdf" stands for probability density function. We call it the probability mass function, PMF.)
3. Press the ENTER key.
4. Enter 10 (this is n), press the comma button, enter .5 (this is p), press the comma button, enter 4, press the right parenthesis button. Then press the ENTER button.
5. You should see the answer: .205
   There is a 20.5% chance of getting 4 heads and 6 tails in 10 flips.
   Comment: This is written: P(X = 4) is .205, where X = number of heads in the 10 flips.

Finding cumulative binomial probabilities

The previous procedure was used to find "equal to" binomial probabilities, as in Table A.1 in the textbook. To find cumulative probabilities (as in Table A.2), use the following procedure:

Example: What is the probability of getting less than or equal to 4 heads (no more than 4 heads) in 10 flips of a fair coin?

1. Press "2^{ND}" and the DISTR key (DISTR is an abbreviation of the word "distribution").
2. Press the down arrow until you get to the 11^{th} one. It is called binomcdf(.
   ("cdf" stands for cumulative distribution function.)
3. Press the ENTER key.
4. Enter 10 (this is n), press the comma button, enter .5 (this is p), press the comma button, enter 4, press the right parenthesis button. Then press the ENTER button.
5. You should see the answer: .377
   There is a 37.7% chance of getting no more than 4 heads in 10 flips of a fair coin.
   Comment: This is written: $P(X \leq 4)$ is .377, where X = number of heads in the 10 flips.

This binomial discussion is especially useful for values of n and p that don't fit the binomial tables.

Finding Poisson probabilities

Example: What is the probability of observing 6 arrivals over a one-minute interval, where the number of arrivals follows a Poisson distribution with a mean of 5 arrivals per minute?

1. Press "2^{ND}" and the DISTR key (DISTR is an abbreviation of the word "distribution").
2. Press the down arrow until you get to the 12^{th} one. It is called poissonpdf(.
   ("pdf" stands for probability density function. We call it the probability mass function, PMF.)
3. Press the ENTER key.
4. Enter 5 (this is the mean, μ), press the comma button, enter 6, press the right parenthesis button. Then press the ENTER button.
5. You should see the answer: .146
   There is a 14.6% chance of observing exactly 6 arrivals over a one-minute interval.
   Comment: This is written: $P(X = 6)$ is .146, where X = number of arrivals over a one-minute interval.

Finding cumulative Poisson probabilities

Comment: Since we do not have a cumulative Poisson table, you might find this especially useful.

Example: What is the probability of observing 6 arrivals or less (no more than 6 arrivals) over a one-minute interval, where the number of arrivals follows a Poisson distribution with a mean of 5 arrivals per minute?

1. Press "2^{ND}" and the DISTR key (DISTR is an abbreviation of the word "distribution").
2. Press the down arrow until you get to the 13^{th} one. It is called poissoncdf(.
   ("cdf" stands for cumulative distribution function.)
3. Press the ENTER key.
4. Enter 5 (this is the mean, μ), press the comma button, enter 6, press the right parenthesis button. Then press the ENTER button.
5. You should see the answer: .762
   There is a 76.2% chance of observing no more than 6 arrivals over a one-minute interval.
   Comment: This is written: $P(X \leq 6)$ is .762, where X = number of arrivals over a one-minute interval.

Finding areas under the Z (standard normal) curve

Comment: These calculators give you the area between two values of Z.

Example: Find the area between zero and 1.52.

1. Press "2^{ND}" and the DISTR key (DISTR is an abbreviation of the word "distribution").
2. Press the down arrow until you get to the 2^{nd} one. It is called normalcdf(.
   ("cdf" stands for cumulative distribution function.)
3. Press the ENTER key.
4. Enter 0, press the comma button, enter 1.52, and press the right parenthesis button.
   Then press the ENTER button.
5. You should see the answer: .4357 (**NOTE**: This agrees with Table A.4.)

Finding areas for any normal random variable, X

Comment: These calculators give you the area between two values of X.

Example: What percentage of male heights is between 5.5' and 6'? Male heights are assumed to follow a normal curve with a mean of 5.75' and a standard deviation of .25'.

1. Press "2^{ND}" and the DISTR key (DISTR is an abbreviation of the word "distribution").
2. Press the down arrow until you get to the 2^{nd} one. It is called normalcdf(.
   ("cdf" stands for cumulative distribution function.)
3. Press the ENTER key.
4. Enter 5.5, press the comma button, enter 6, press the comma button, enter 5.75 (this is the mean, μ), press the comma button, enter .25 (this is the standard deviation, σ), and press the right parenthesis button. Then press the ENTER button.
5. You should see the answer: .6827.
   (**NOTE**: This is the area under the Z curve between -1 and 1.)

Solving backwards problems for the Z (standard normal) curve

Comments: (1) Here, you are provided the area and asked to find the value of Z.
(2) The calculator needs to know the area to the left of the value you are looking for.

Example: For what value of Z (say, z) is this true? $P(Z \leq z) = .75$?

1. Press "2^{ND}" and the DISTR key.
2. Press the down arrow until you get to the 3^{rd} one. It is called invNorm(.
   ("invNorm" stands for inverse normal.)
3. Press the ENTER key.
4. Enter .75 and press the right parenthesis button.
   Then press the ENTER button.
5. You should see the answer: .674 (**NOTE**: So, the area to left of .674 under the Z curve is .75.)

Example: For what value of Z (say, z) is this true? $P(Z > z) = .05$?

1. Press "2^{ND}" and the DISTR key.
2. Press the down arrow until you get to invNorm(.
3. Press the ENTER key.
4. Enter .95 since the area to the left of z is 1 - .05 = .95. Press the right parenthesis button and press the ENTER button.
5. You should see the answer: 1.645 (**NOTE**: The area to right of 1.645 under the Z curve is .05.)

Solving backwards problems for any normal random variable, X

Comments: (1) Here, you are provided the area and asked to find the value of X.
(2) The calculator needs to know the area to the left of the value you are looking for.

Example: Suppose male heights are assumed to follow a normal distribution with a mean of 5.75' and a standard deviation of .25'.
For what value of X (say, x) is this true: $P(X \geq x) = .10$?

1. Press "2^{ND}" and the DISTR key.
2. Press the down arrow until you get to the 3^{rd} one. It is called invNorm(. ("invNorm" stands for inverse normal.)
3. Press the ENTER key.
4. The area to the right of x (we are told) is .10. But we need the area to the left of x (always left using the TI 83 or 84). This would be 1 - .10 = .90.
5. Enter .90, press the comma button, enter 5.75 (this is the mean, μ), press the comma button, enter .25 (this is the standard deviation, σ), and press the right parenthesis button. Then press the ENTER button.
6. You should see the answer: 6.07 (**NOTE**: So, the area to the right of 6.07' under this normal curve is .10.)

Example: For what value of X (say, x) is this true: $P(X < x) = .05$? Again, male heights (X) are assumed to follow a normal distribution with a mean of 5.75' and a standard deviation of .25'.

1. Press "2^{ND}" and the DISTR key.
2. Press the down arrow until you get to invNorm(.
3. Press the ENTER key.
5. Here, .05 is the area to the left of x. So, enter .05, press the comma button, enter 5.75 (this is the mean, μ), press the comma button, enter .25 (this is the standard deviation, σ), and press the right parenthesis button. Then press the ENTER button.
6. You should see the answer: 5.34 (**NOTE**: So, the area to the left of 5.34' under this normal curve is .05.)