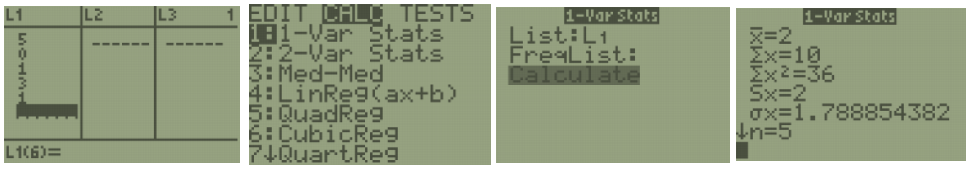
Chapter 3 Formulas

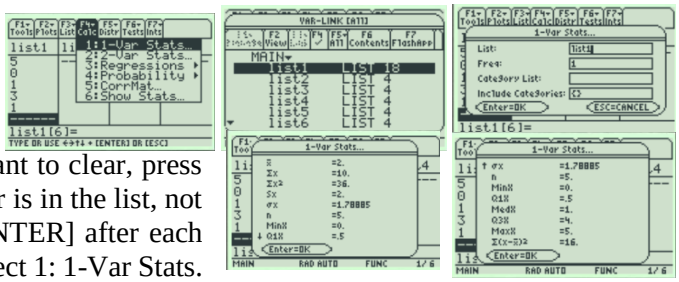
Sample Mean = $\bar{x} = \frac{\sum x}{n}$	Population Mean = $\mu = \frac{\sum x}{N}$
Weighted Mean = $\frac{\sum(xw)}{\sum w}$	Range = Max – Min
Sample Standard Deviation = $s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$	Population Standard Deviation = $\sigma = \sqrt{\frac{\sum(x-\mu)^2}{N}}$
Sample Variance = $s^2 = \frac{\sum(x-\bar{x})^2}{n-1}$	Population Variance = $\sigma^2 = \frac{\sum(x-\mu)^2}{N}$
Coefficient of Variation = CVar = $\left(\frac{s}{\bar{x}} \cdot 100\right)\%$	Z-Score = $z = \frac{x-\bar{x}}{s}$
Percentile Index = $i = \frac{(n+1)\cdot p}{100}$	The interquartile range = IQR = $Q_3 - Q_1$
Outlier Lower Limit = Q_1 – (1.5·IQR)	Outlier Upper Limit = Q_3 + (1.5·IQR)
Empirical Rule: z = 1, 2, 3 ⇒ 68%, 95%, 99.7%	Chebyshev's Inequality = $\left(\left(1 - \frac{1}{(z)^2}\right) \cdot 100\right)\%$

TI-84



Enter the data in a list and then press [STAT]. Use cursor keys to highlight CALC. Press 1 or [ENTER] to select **1:1-Var Stats**. Press [2nd], then press the number key corresponding to your data list. Press Enter to calculate the statistics. Note: the calculator always defaults to L1 if you do not specify a data list.

TI-89



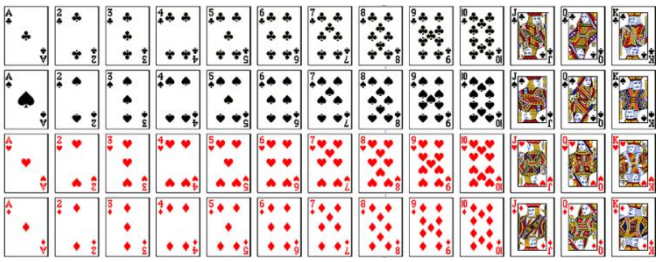
Press [APPS], select **FlashApps** then press [ENTER]. Highlight **Stats/List Editor** then press [ENTER]. Press [ENTER] again to select the main folder. To clear a previously stored list of data values, arrow up to the list name you want to clear, press [CLEAR], then press enter. Make sure the cursor is in the list, not on the list name and type the data pressing [ENTER] after each one. Enter all x-values in one list. Press [F4], select 1: 1-Var Stats. To get the list name to the List box, press [2nd] [Var-Link], arrow down to list1 and press [Enter]. This will bring list1 to the List box. Select [Enter] to enter the list name and then enter again to calculate. Use the down arrow key to see all the statistics.

Chapter 4 Formulas

Sum of Two Dice

	+	Second Die 1	2	3	4	5	6
First Die	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

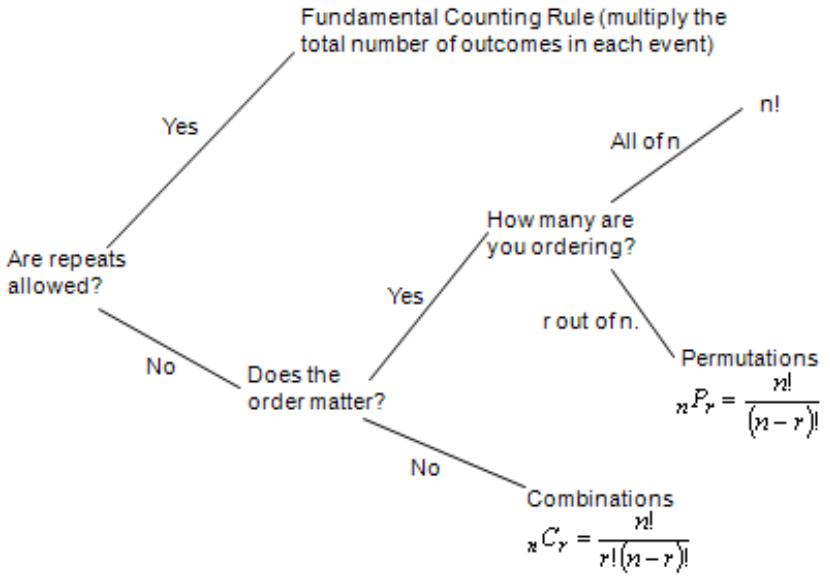
Standard Deck of Cards



Complement Rules: $P(A) + P(A^C) = 1$ $P(A) = 1 - P(A^C)$ $P(A^C) = 1 - P(A)$	Mutually Exclusive Events: $P(A \cap B) = 0$
Union Rule: $P(A \cup B) = P(A) + P(B) - P(A \cap B)$	Independent Events: $P(A \cap B) = P(A) \cdot P(B)$
Intersection Rule: $P(A \cap B) = P(A) \cdot P(B|A)$	Conditional Probability Rule: $P(A|B) = \frac{P(A \cap B)}{P(B)}$
Fundamental Counting Rule: $m_1 \cdot m_2 \cdots m_n$	Factorial Rule: $n! = n \cdot (n-1) \cdot (n-2) \cdots 3 \cdot 2 \cdot 1$
Combination Rule: ${}_nC_r = \frac{n!}{(r!(n-r)!)}$	Permutation Rule: ${}_nP_r = \frac{n!}{(n-r)!}$

TI-84 Combinations/Permutations: Enter the number "trials" (n) on the home screen. Press [MATH]. Use cursor keys to move to the PRB menu. Press 2 for permutation (2: ${}_nP_r$), 3 for combination (3: ${}_nC_r$). Enter the number of "successes" (r). Press [ENTER] to calculate.

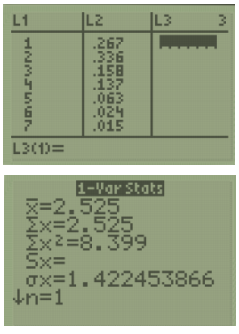
TI-89 Combinations/Permutations: Press [2nd] Math > 7:Probability > Press 2 for permutation (2: ${}_nP_r$), 3 for combination (3: ${}_nC_r$). Enter the sample size on the home screen, then a comma, then enter the number of "successes" then end the parenthesis. Press [ENTER] to calculate.



Chapter 5 Formulas

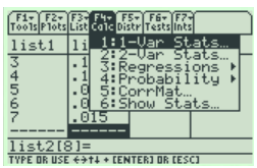
Discrete Distribution Table: $0 \leq P(x) \leq 1$ $\sum P(x) = 1$	Discrete Distribution Mean: $\mu = \sum(x \cdot P(x))$
Discrete Distribution Variance: $\sigma^2 = \sum(x^2 \cdot P(x)) - \mu^2$	Discrete Distribution Standard Deviation: $\sigma = \sqrt{\sigma^2}$

TI-84 Calculator Instructions for Mean, Variance & Standard Deviation
Select [STAT] then (1:Edit). Make sure the cursor is in the list, not on the list name and type the desired values pressing [ENTER] after each one. For x and P(x) data pairs, enter all x-values in one list. Enter all corresponding P(x)-values in a second list. Press [STAT]. Use cursor keys to highlight CALC. Press 1 or [ENTER] to select **1:1-Var Stats**. Press [2nd], then press the number key corresponding to your x list, then a comma, then [2nd] and the number key corresponding to your P(x) values. (Should look like this 1-Var Stats L_1,L_2) Press Enter to calculate the statistics. Where the calculator says $\bar{x}$ this is μ the population mean and σ_x is the population standard deviation (square this number to get the population variance).



TI-89 Calculator Instructions for Mean, Variance & Standard Deviation

Go to the [Apps] **Stat/List Editor**, and type the X values into List 1 and P(X) values into List2. Select F4 for the **Calc** menu. Use cursor keys to highlight **1:1-Var Stats**. Under List, select [2nd] Var-Link, then select list1. Under Freq, select [2nd] Var-Link, then select list2. Press enter twice and the statistics will appear in a new window. Use the cursor keys to arrow up and down to see all of the values. Note: $\bar{x}$ this is μ the population mean and σ_x is the population standard deviation; square this value to get the variance.



Binomial Distribution: P(X = x) = ${}_nC_x \cdot p^x \cdot q^{n-x}$ Mean: $\mu = n \cdot p$; Variance: $\sigma^2 = n \cdot p \cdot q$; Standard Deviation: $\sigma = \sqrt{n \cdot p \cdot q}$		
P(X = x)	P(X ≤ x)	P(X ≥ x)
Is	Is less than or equal to	Is greater than or equal to
Is equal to	Is at most	Is at least
Is exactly the same as	Is not greater than	Is not less than
Has not changed from	Within	Is more than or equal to
Is the same as		
binompdf(n,p,x)	binomcdf(n,p,x)	1-binomcdf(n,p,x-1)
	P(X > x)	P(X < x)
	More than	Less than
	Greater than	Below
	Above	Lower than
	Higher than	Shorter than
	Longer than	Smaller than
	Bigger than	Decreased
	Increased	Reduced
TI Calculator:	1-binomcdf(n,p,x)	binomcdf(n,p,x-1)

TI-84 Calculator Instructions for Binomial Distribution

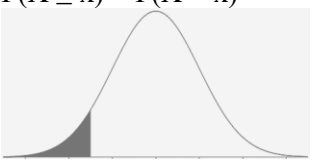
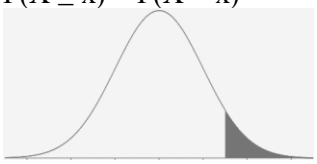
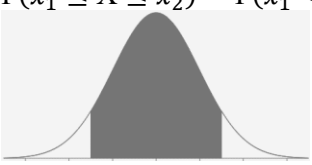
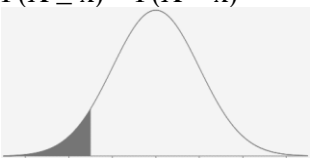
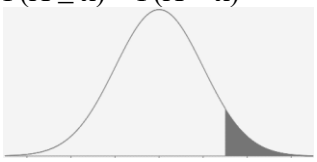
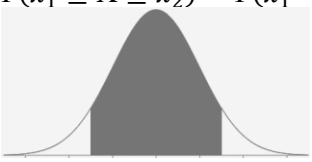
Press [2nd] [DISTR]. This will get you a menu of probability distributions. Press 0 or arrow down to **0:binompdf(** and press [ENTER]. This puts binompdf(on the home screen. Enter the values for n, p and x with a comma between each. Press [ENTER]. This is the probability density function and will return you the probability of exactly x successes. If you leave off the x value and just enter n and p, you will get all the probabilities for each x from 0 to n. Press [ALPHA] A or arrow down to **A:binomcdf(** and press [ENTER]. This puts binomcdf(on the home screen. Enter the values for n, p and x with a comma between each. Press [ENTER]. This is the cumulative distribution function and will return you the probability of at most (≤) x successes. If you have at least x success (≥), use the complement rule. If you have < or > adjust x to get ≤ or ≥.

TI-89 Calculator Instructions for Binomial Distribution

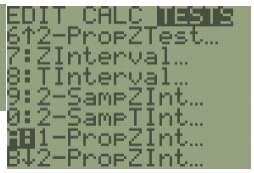
Go to the [Apps] **Stat/List Editor**, then select F5 [DISTR]. This will get you a menu of probability distributions. Arrow down to **binomial Pdf** and press [ENTER]. Enter the values for n, p and x into each cell. Press [ENTER]. This is the probability density function and will return you the probability of exactly x successes. If you leave off the x value and just enter n and p, you will get all the probabilities for each x from 0 to n. Arrow down to **binomial Cdf** and press [ENTER]. Enter the values for n, p and lower and

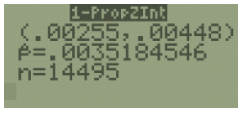
upper value of x into each cell. Press [ENTER]. This is the cumulative distribution function and will return you the probability between the lower and upper x-values, inclusive.

Chapter 6 Formulas

<table>
<tr>
<td>Uniform Distribution:
$f(x) = \frac{1}{b-a}$, for $a \le x \le b$
P(X ≥ x) = $\left(\frac{1}{b-a}\right) \cdot (b - x)$
P(X ≤ x) = $\left(\frac{1}{b-a}\right) \cdot (x - a)$
P($x_1 \le X \le x_2$) = $\left(\frac{1}{b-a}\right) \cdot (x_2 - x_1)$</td>
<td></td>
</tr>
<tr>
<td>Standard Normal Distribution:
μ = 0, σ = 1
Z-score: $z = \frac{x-\mu}{\sigma}$</td>
<td>Central Limit Theorem:
Z-score: $z = \frac{\bar{x}-\mu}{\left(\frac{\sigma}{\sqrt{n}}\right)}$</td>
</tr>
<tr>
<td>Normal Distribution Probabilities:</td>
<td>P(X ≤ x) = P(X < x)
 
TI-84: normalcdf(-1E99,x,μ ,σ)</td>
</tr>
<tr>
<td>P(X ≥ x) = P(X > x)
 
TI-84: normalcdf(x,1E99,μ ,σ)</td>
<td>P($x_1 \le X \le x_2$) = P($x_1 < X < x_2$)
 
TI-84: normalcdf(x_1,x_2,μ ,σ)</td>
</tr>
<tr>
<td>Inverse Normal Distribution:</td>
<td>P(X ≤ x) = P(X < x)
 
TI-84: invNorm(area,μ,σ)</td>
</tr>
<tr>
<td>P(X ≥ x) = P(X > x)
 
TI-84: invNorm(1–area,μ,σ)</td>
<td>P($x_1 \le X \le x_2$) = P($x_1 < X < x_2$)
 
TI-84: x_1 = invNorm(area/2,μ ,σ)
x_2 =invNorm(1–area/2,μ ,σ)</td>
</tr>
</table>

Chapter 7 Formulas

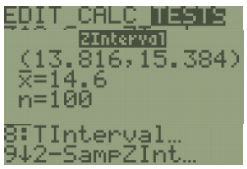




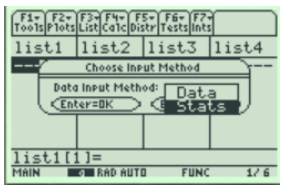
TI-84: Press the [STAT] key, arrow over to the [TESTS] menu, arrow down to the [A:1-PropZInterval] option and press the [ENTER] key. Then type in the values for X, sample size and confidence level, arrow down to [Calculate] and press the [ENTER] key. The calculator returns the answer in interval notation. Note: sometimes you are not given the x value but a percentage instead. To find the x to use in the calculator, multiply $\hat{p}$ by the sample size and round off to the nearest integer. The calculator will give you an error message if you put in a decimal for x or n. For example if $\hat{p}$ = 0.22 and n = 124 then 0.22*124 = 27.28, so use x = 27.

TI-89: Go to the [Apps] **Stat/List Editor**, then select 2nd then F7 [Ints], then select **5: 1-PropZInt**. Type in the values for X, sample size and confidence level, and press the [ENTER] key. The calculator returns the answer in interval notation. Note: sometimes you are not given the x value but a percentage instead. To find the x value to use in the calculator, multiply $\hat{p}$ by the sample size and round off to the nearest integer. The calculator will give you an error message if you put in a decimal for x or n. For example if $\hat{p}$ = 0.22 and n = 124 then 0.22*124 = 27.28, so use x = 27.

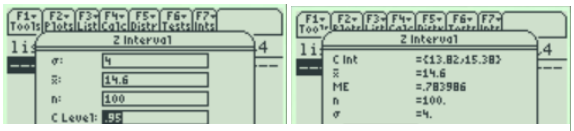
Confidence Interval for One Proportion $\hat{p} \pm z_{\alpha/2}\sqrt{\left(\frac{\hat{p}\hat{q}}{n}\right)}$ $\hat{p} = \frac{x}{n}$ $\hat{q} = 1 - \hat{p}$ TI-84: 1-PropZInt	Sample Size for Proportion: $n = p^* \cdot q^* \left(\frac{z_{\alpha/2}}{E}\right)^2$ Always round up to whole number. If p is not given use p^* = 0.5. E = Margin of Error
Confidence Interval for One Mean Use z-inteval when σ is known. Use t-interval when s is known. If n < 30, population needs to be normal.	z-interval $\bar{x} \pm z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$ TI-84: ZInterval
Z-Critical Values TI-84: $z_{\alpha/2}$ = invNorm(1–area/2,0,1)	T-Critical Values TI-84: $t_{\alpha/2}$ = invT(1–area/2,df)
t-interval, df = n – 1 $\bar{x} \pm t_{\alpha/2,n-1}\left(\frac{s}{\sqrt{n}}\right)$ TI-84: TInterval	Sample Size for Mean $n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E}\right)^2$ Always round up to whole number.



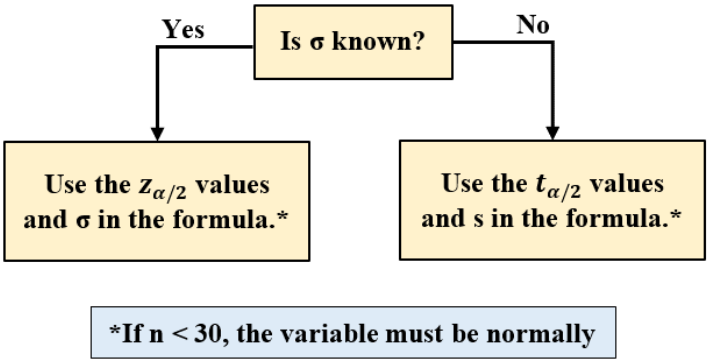
TI-84: Press the [STAT] key, arrow over to the [TESTS] menu, arrow down to the [7:ZInterval] option and press the [ENTER] key. Arrow over to the [Stats] menu and press the [ENTER] key. Then type in the population or sample standard deviation, sample mean, sample size and confidence level, arrow down to [Calculate] and press the [ENTER] key. The calculator returns the answer in interval notation.



TI-89: Go to the [Apps] **Stat/List Editor**, then select 2nd then F7 [Ints], then select **1: ZInterval**. Choose the input method, **data** is when you have entered data into a list previously or **stats** when you are given the mean and standard deviation already. Type in the population standard deviation, sample mean, sample size (or list name (list1), and Freq: 1) and confidence level, and press the [ENTER] key to calculate. The calculator returns the answer in interval notation.



TI-84: Press the [STAT] key, arrow over to the [TESTS] menu, arrow down to the [8:TInterval] option and press the [ENTER] key. Arrow over to the [Stats] menu and press the [ENTER] key. Then type in the mean, sample standard deviation, sample size and confidence level, arrow down to [Calculate] and press the [ENTER] key. The calculator returns the answer in interval notation. Be careful, if you accidentally use the [7:ZInterval] option you would get the wrong answer.



Alternatively (If you have raw data in list one) Arrow over to the [Data] menu and press the [ENTER] key. Then type in the list name, L_1, leave Freq:1 alone, enter the confidence level, arrow down to [Calculate] and press the [ENTER] key.

TI-89: Go to the [Apps] **Stat/List Editor**, then select 2nd then F7 [Ints], then select **2:TInterval**. Choose the input method, data is when you have entered **data** into a list previously or **stats** when you are given the mean and standard deviation already. Type in the mean, standard deviation, sample size (or list name (list1), and Freq: 1) and confidence level, and press the [ENTER] key. The calculator returns the answer in interval notation. Be careful, if you accidentally use the [1:ZInterval] option you would get the wrong answer.

Chapter 8 Formulas

Hypothesis Test for One Mean If n < 30, population needs to be normal.	Type I Error-Reject H_0 when H_0 is true. Type II Error-Fail to reject H_0 when H_0 is false.
t-Test: $H_0: \mu = \mu_0$ $H_1: \mu \neq \mu_0$ $t = \frac{\bar{x}-\mu_0}{\left(\frac{s}{\sqrt{n}}\right)}$ TI-84: T-Test	Hypothesis Test for One Proportion $H_0: p = p_0$ $H_1: p \neq p_0$ $z = \frac{\hat{p}-p_0}{\sqrt{\left(\frac{p_0 q_0}{n}\right)}}$ TI-84: 1-PropZTest
p-value rejection rule: Reject H_0 when the p-value ≤ alpha Do not reject H_0 when the p-value > alpha	