These steps outline how to use a TI-84 calculator for MAT 1272. At the end of the steps for each calculation, a summary of the steps is also shown. To set number of decimal places, press MODE then use down arrow to FLOAT and press ENTER, then use arrow right and select a number from 1 through 9 and press ENTER. Return to home screen by pressing 2ND Mode.

Chapter 1 – Entering and Editing Data

Note that the TI-84 has a blue button labelled 2ND, and a green button labelled ALPHA. Also, other buttons have a label on them, and most also have labels in blue and green above them. This means that most buttons are used for three different meanings!

In the steps below, MATH does not mean the calculator button labelled MATH; rather, it means a choice on the display screen that should use arrow over to select.

When STAT is pressed, the screen shows EDIT CALC TESTS in the top line. EDIT is already shown highlighted, as well as 1:

To view lists in the editor, the steps to use are STAT>EDIT>1:Edit. Since 1: is already highlighted, press 1 or just press ENTER and you'll see columns labelled L1, L2, L3 . . . at top of screen.

To clear all data in a list, the steps to use are STAT>EDIT and use down arrow button to select choice 4: ClrList.   Press ENTER, then 2ND and then 1 to indicate list 1, then 2nd and then 2 to indicate list 2, and so on, then press ENTER. The calculator screen displays Done.

To enter data in a list, the steps to use are STAT>EDIT> and since 1: is already highlighted, press ENTER. Type each data value and press ENTER after each, to automatically move to the next row down in that list. To type data into another list, use > or < arrows to move to desired place on screen, where that list is located. To edit values in a list, use arrow keys to get to desired location, reinput that data item completely, then press ENTER (which moves to next row down in that list).

Summary: STAT EDIT

Chapter 3 – Creating Summary Statistics

This is useful to calculate the mean, the sum of the data values ($\sum x$), the sum of the squares of the data values ($\sum x^2$), the sample standard deviation (s_x), the population standard deviation (σ_x), number of data values in a sample (n), minimum data value, first quartile Q_1, median (second quartile), third quartile Q_3, and maximum data value.

Clear all lists. Then input data into L1.

To see a screen that displays all these answers, the steps to use are STAT>CALC>1: 1-Var Stats. Press 1 and screen will show 1-Var Stats. Press ENTER. Next press 2ND and then 1 for list 1and then press ENTER. Immediately on the screen you'll see all the statistical items listed in the paragraph above. Use the down arrow to see the last 5 statistical items.

Summary: STAT EDIT L1; STAT CALC (1) 1-Var Stats

Chapter 3 – Creating a Box-and-Whisker Plot

Here are the steps to see a screen that displays the data's first quartile, median, third quartile, smallest value in lower inner fence, largest value in upper inner fence, any outliers, and whether distribution is symmetric or skewed.

Clear all lists. Then input data for boxplot into L1.

Press 2ND Y= to see the STAT PLOTS menu. Select Plot1 On. Press ENTER. In Plot1 menu in Type select the fourth choice (modified box-and-whisker plot). At Xlist input L1 (if not already shown), then arrow down to Mark (it should be flashing) (to denote outliers) then press Zoom and arrow down to Zoom Stat (choice 9) and press ENTER. The shape of the boxplot appears on the screen.

Summary: 2ND Y= Plot1 Box and Whisker L1 Mark (for Outliers) Zoom Zoom Stat

Chapter 13 – Finding the Scatter Plot, Regression Equation, r^2 and r

To prepare a scatter plot, first input data into L_1 and L_2. Use L_1 for the independent variable, and L_2 for the dependent variable. Press 2ND Y=and then press ENTER (STAT PLOTS and 1: were highlighted.) Plot1 and On are already highlighted now. At "Type" press the first graph diagram (now highlighted). Then use down arrow to small square (now flashing). Press 2nd STAT L_1 press ENTER press comma press 2nd L_2 and then Zoom and then arrow down to 9 (this is ZoomStat) and then ENTER. The display will show small squares where each (x,y) is located. This is the scatter plot.

To calculate the a and b values of the regression line y = a + bx, as well as r^2 and r, the steps are 2ND>Catalog (use the 0 button at the bottom of the TI-84) and press 2ND ALPHA and the letter D and arrow down through the alphabetical list of D items to Diagnostic On press ENTER and press ENTER again. You'll see Done on right hand side of the next line. The next steps are STAT>CALC> arrow down to 8: (this choice is LinReg (a+bx) ENTER press 2ND and list number to use for the x (independent variable)press comma and then press 2ND and list number to use for the y (dependent variable) and then press ENTER. The display will show answers for a, b, r^2 and r.

Summary: STAT EDIT L1 and L2 STAT CALC(4) LinReg (a + bx)   Be sure Diagnostic is On to get r value

Chapter 4 – Calculating Factorials, Combinations and Permutations

For these calculations, MATH means the calculator button labelled MATH; it <u>does not</u> mean to toggle over to on the display screen, as was done for instructions for previous Chapters.

The symbol n! (read as <u>n factorial</u>) represents the product of all integers from n down to 1.

n! = n(n-1) (n-2) (n-3) . . . (3) (2) (1)

The steps to calculate n! are to press the numbers on the calculator associated with n, then MATH>PRB>! (this is choice 4) and then press ENTER twice. The result of the calculation appears on the right side of the display.

The number of <u>combinations</u> for selecting x from n distinct items is given by the formula

$$_nC_x = \frac{n!}{x!(n-x)!}$$ For combinations, the order of selections <u>is not</u> important.

The steps to calculate $_nC_x$ are to press the number on the calculator associated with n, then MATH>PRB> nCr then press ENTER and then press the number on the calculator associated with x, and then press ENTER. The result of the calculation appears on the right side of the display.

<u>Summary:</u> MATH PRB(3) $_nC_x$

The number of <u>permutations</u> for selecting the number of permutations (arrangements) of selecting x items from n distinct items, is given by the formula

$$_nP_x = \frac{n!}{(n-x)!}$$ For permutations, the order of selections <u>is</u> important.

The steps to calculate $_nP_x$ are to press the number on the calculator associated with n, then MATH>PRB>nPr then press ENTER and then press the number on the calculator associated with x, and then press ENTER. The result of the calculation appears on the right side of the display.

<u>Summary:</u> MATH PRB(2) $_nP_x$

Chapter 5 – Calculating Mean and Standard Deviation of a Discrete Random Variable

First input data into L1 and L2. The data for L1 is all the values that the discrete random variable can assume. The data for L2 is the corresponding probabilities of each random variable. Note that the sum of all probabilities in L2 is 1.

To see a screen that displays the answers, the steps to use are STAT>CALC>1: 1-Var Stats. Press 1 and the screen will show 1-Var Stats. Press ENTER. Next press 2ND and then 1 for list 1 comma and 2ND and then 2 for list 2 and then press ENTER. Immediately on the screen you'll see the mean of the discrete random variable and four lines later is the standard deviation of the discrete random variable.

Summary: STAT CALC (1) 1-Var Stats L1, L2

Chapter 5 – Calculating Binomial Probabilities and Cumulative Binomial Probabilities and Binomial Probability Distribution

The binomial probability P(x) is given by the formula

$$P(x) = {_nC_x}\, p^x\, q^{n-x}, \text{ where}$$

n = number of independent trials

p = probability of success on a trial

q = 1 – p = probability of failure on a trial

x = number of successes in n trials

n – x = number of failures in n trials

The steps to calculate P(x), which is the probability of exactly x successes, are 2nd>VARS and then arrow down to choice A: binompdf(and press ENTER. Key in n then comma then probability of success then comma and then x and then) and press ENTER. For example, 2nd>VARS binompdf (n, p, x) . This is binomial probability.

Summary: 2nd VARS (10) binompdf (trials, p, x)

The steps to calculate $P(X \leq x)$, which is <u>probability of less than or equal to x successes</u>, is 2nd>VARS and then arrow down to B: binomcdf(and press ENTER. Key in n then comma then probability of success then comma and then x and then) and press ENTER. For example, 2nd>VARS binomcdf (n, p, x) . This is <u>cumulative binomial probability</u>.

<u>Summary:</u> 2nd VARS (11) binomcdf (trials, p, x)

Chapter 6 – Calculating a Left-Tail Probability, Calculating a Probability Between Two Values, Calculating a Right-Tail Probability and Determining z When a Probability is Known

Use this information in what follows. To key in -1E99, use (-) key to denote negative number, then 1, then 2nd then comma then 99. To key in 1E99, use 1, then 2nd then comma then 99. 1E99 means no upper limit, and -1E99 means no lower limit on the TI – 84 Calculator.

The steps to calculate a left-tail probability are 2nd>VARS>normalcdf(. Key in -1E99 then comma then reference number (this is the upper limit of the left tail) then comma then mean then comma then standard deviation and then) and press ENTER. The result of the calculation appears on the right side of the display.

Summary: 2nd VARS (2) normalcdf (lower, upper, mean, standard deviation)

The steps to calculate a probability between two values is 2nd>VARS>normalcdf(. Key in the lower reference number (this is the lower number of the range) then comma then upper reference number (this is the upper limit of the range) then comma then mean then comma then standard deviation and then) and press ENTER. The result of the calculation appears on the right side of the display.

Summary: 2nd VARS (2) normalcdf (lower, upper, mean, standard deviation)

The steps to calculate a right-tail probability are 2nd>VARS>normalcdf(. Key in the reference number (this is the lower limit of the right tail) then comma then 1E99 then comma then mean then comma then standard deviation and then) and press ENTER. The result of the calculation appears on the right side of the display.

Summary: 2nd VARS (2) normalcdf (lower, upper, mean, standard deviation)

The steps to determine z when a probability is known are 2nd>VARS>invnormal(. Key in the reference probability then comma then mean then comma then standard deviation and then) and press ENTER. The result of the calculation appears on the right side of the display.

Summary: 2nd VARS (3) invNorm(area, mean, standard deviation)

Chapter 7 – Calculating Probabilities in the Sampling Distribution of x bar

To find the probability between two points of the distribution of the sample mean, use the same steps in normalcdf as in chapter 6 steps, <u>except use standard deviation of the sampling distribution instead of the population standard deviation.</u>

The steps to calculate a probability <u>between two values</u> is 2nd>VARS>normalcdf(. Key in the lower reference number (this is the lower number of the range) then comma then upper reference number (this is the upper limit of the range) then comma then mean then comma then <u>standard deviation of the sampling distribution</u> and then) and press ENTER. The result of the calculation appears on the right side of the display.

<u>Summary:</u> 2nd VARS (2) normalcdf (lower, upper, mean, standard deviation of the sampling distribution)

Chapter 11 – Calculating a Chi-Square Goodness of Fit Test

Enter Observed values into L_1 and Expected values into L_2. The steps to calculate Chi-Square are STAT>TESTS> Chi-Square GOF-Test (arrow down to choice D) and press ENTER. Type L_1 after Observed: and L_2 after Expected: and then degrees of freedom and then highlight calculate and then press ENTER. The Chi-Square test statistic is shown.

<u>Summary:</u> STAT TESTS Chi-Square GOF-Test 9 (D) L1 L2 df