Inverse Normal Distribution calculations – with and without the average given.

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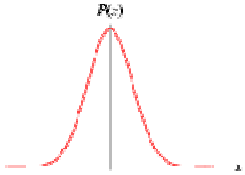
Select STAT icon (or press 2) from the main menu and the EQUA icon (or press A) or by using the arrow keys to highlight and then press EXE.

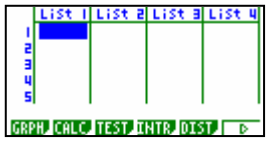
This worksheet shows how the calculator can be used to calculate inverse normal distribution problems both with and without the average known.

A normal distribution in a variate *X* with mean 'μ' and variance 'σ' is a statistic distribution with probability function as illustrated here P(x).

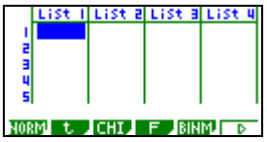


In **STAT**

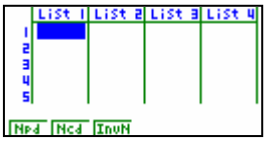
F5 for **DIST**ribution



then **F1** for **NORM**al



then **F3** for **In**verse**N**ormal

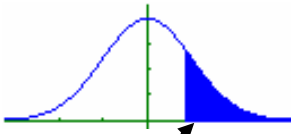


N.B. The Inverse Normal calculates for the left tail of the normal curve.

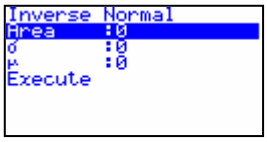
Example 1: At Tane and Koha's home the mail is delivered in the afternoon. The delivery times are normally distributed with a mean of 1:20pm and a standard deviation of 23 minutes.

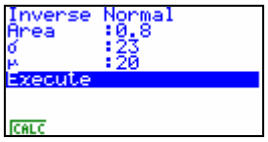
Koha leaves home at the same time each day. If the mail is delivered after this time Koha considers that the mail is delivered 'late'. Koha notices that over a period of time she has found that the mail is delivered late 20% of the time Find the time, to the nearest minute, that Koha leaves the house and hence the late mail delivery time at Tane and Koha's home.

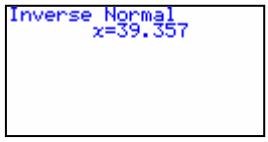
Answer: Here use the average μ = 20 minutes (relates to 1:20pm) and σ = 23 minutes. Probability = 0.8 form the left tail of the normal curve.



Need to find the time that is here







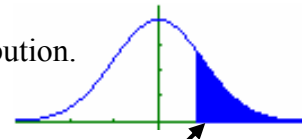
Answer: 39.357 minutes.

Interpretation: Find the earliest time that the mail can be considered as being delivered 'late' at Tane and Koha's home is at 1:39pm (to the nearest minute)

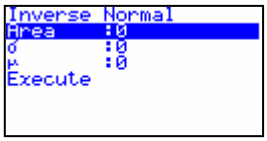
Example 2: At Derek and Janice's home the mail is delivered in the morning. The delivery times are normally distributed with a standard deviation of 16 minutes. If the mail is delivered after 11:15am it is considered that the mail is delivered 'late'. Over a period of time they found that the mail is delivered late 35% of the time

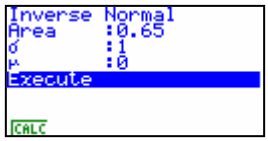
Find the average time, to the nearest minute, for this normally distribution delivery times for mail at Derek and Janice's home.

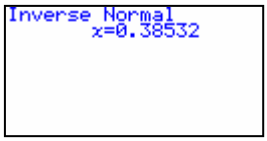
Answer: Here use the average μ = 0 minutes and σ = 1 minutes, a standard normal distribution. Probability = 0.65 form the left tail of the normal curve.



Need to find the time that is here





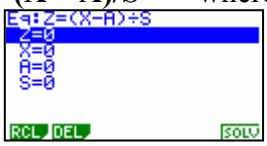


Answer: Z = 0.38532 standard deviations from the 'true' average.

Now enter into **EQUA** icon and the **SOLV**er

Enter in the Z-score transform equation:

Z = (X – A)/S where A = average and S = standard deviation

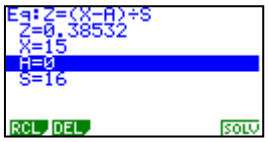


Enter in what is known

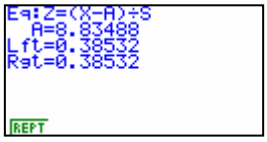
Z = 0.38532

X = 15 minutes (11:15am)

S=16 minutes



Now move the cursor so that it is 'resting' over the unknown variable (A). What we want to find the value of then press **F6** or **EXE** to solve.



Answer: Average = 8.83488 minutes.

Interpretation: The average time for this normally distribution delivery times at Derek and Janice's home is 11:09am (nearest minute).