Normal distribution using TI 84:

1. Given the population mean, \( \mu = 32 \); and, the population standard deviation, \( \sigma = 2.25 \), find:
   a) Probability of \( x < 30 \).
   b) Probability of \( x > 35 \).
   c) Probability of \( x \) greater than 30 and less than 35; that is \( P(30 < x < 35) \)
   d) If we choose 56 values of the random variable at random, and the sample mean is \( \bar{x} = 33 \),
      considering that the population standard deviation is 2.25, what is the probability that samples
      of the same size are less than 33?
   e) What is the \( x \) value that is above 99% of all other values of the variable?

ANWERS, TI 84:

Press 2\(^{nd}\) DIST:

\[ \text{Press 2\(^{nd}\) DIST:} \]

\[ \text{a) Probability of } x < 30: \]

TI84, choose normalcdf and enter the lower, upper, mean and standard deviation values.

\[ \text{normalcdf} \]

\[ \text{lower: } -1\times10^9 \]
\[ \text{upper: } 30 \]
\[ \mu: 32 \]
\[ \sigma: 2.25 \]
\[ \text{Paste} \]

The lower bound is negative infinite, represented by \(-\text{EE}99\) (Press the little negative, then 2\(^{nd}\), then the comma key, and then 99). For negative infinite you may also enter -10000 or -99999.

The answer to a) is 0.1870 rounded to four decimal places:

\[ \text{normalcdf}(-1\times99,30,32,2.2) \]
\[ \text{..............................},1870313608 \]

b) Probability of \( x > 35 \).

Greater than 35 means that 35 is the lower bound; the upper bound is infinity: E99. As follows:
The answer to b) is 0.0912 rounded to four decimal places:

```
normalcdf(35, e99, 32, 2.25)
```

\[0.0912112819\]

c) \(P_{(30 < x < 35)}\)

Lower bound is 30, upper bound is 35:

```
normalcdf(30, 35, 32, 2.25)
```

\[0.7217573574\]

d) For a random sample of the variable \(x\), of size \(n = 56\), the probability that samples means of the same size are less than 33:

In this case, the Central limit theorem applies; therefore, we divide the standard deviation by the square root of the sample size. This is a question of less than a value, as follows:

```
normalcdf(-e99, 33, 32, 2.25/sqrt(56))
```

Answer: The probability that samples of size 56 are less than 33, is about 0.9996:
e) The x value that is above 99% of all other values of the variable: In this case we know the probability or area, 0.99; choose Inverse Normal:

```
DISTR DRAW
1: normalPdf()
2: normalCdf()
3: invNorm()
4: invT()
5: tPdf()
6: tcdf()
7: chisqPdf()
8: chisqCdf()
9: Fcdf()
```

inv Norm in TI 84, again, we don’t need to remember the syntax:

```
invNorm
area: 0.99
μ: 32
σ: 2.25
Paste
```

The answer to d) is the variable x value that is above 99% of the population is x = 37.23, rounding to two decimal places.

```
invNorm(0.99, 32, 2.25)
.......................... 37.23428272
```