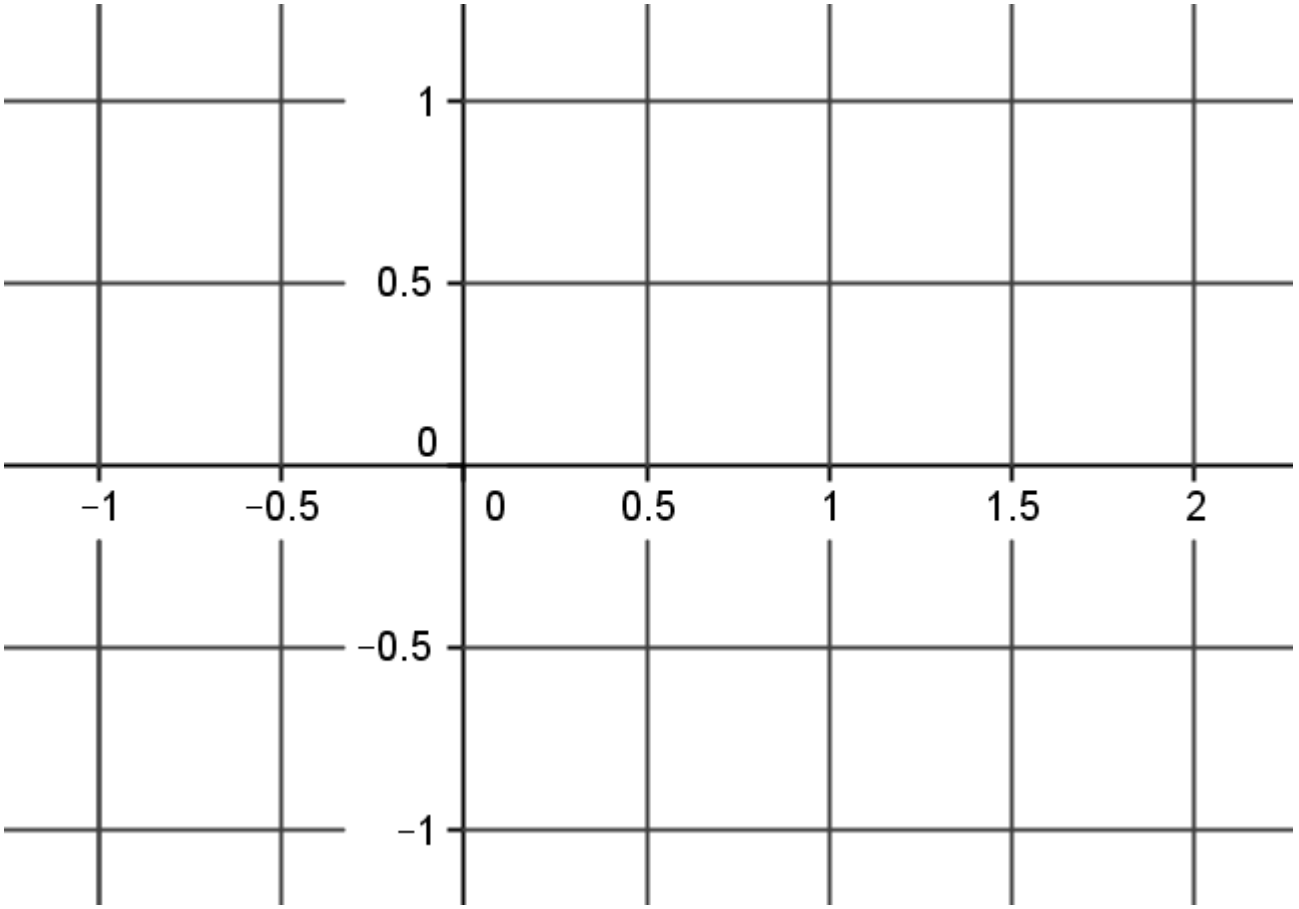
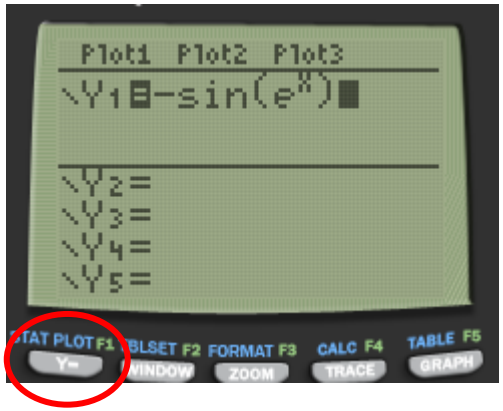
g1

Draw the graph of $y = -\sin(e^x)$ for $-1 \leq x \leq 2$

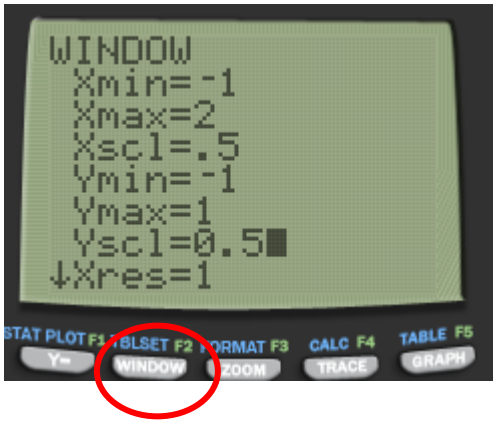


1. Input the graph



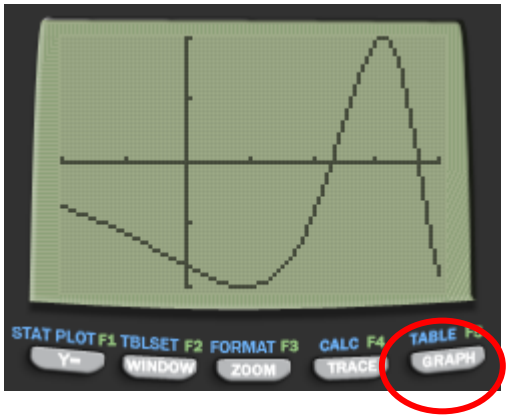
Remember to use the (-) and not — button for negative numbers

2. Adjust the window



Choose min and max values for x and y axis. Xscl and Yscl are the numbers to count along in.

3. View the graph

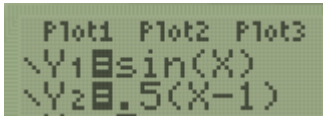


g2

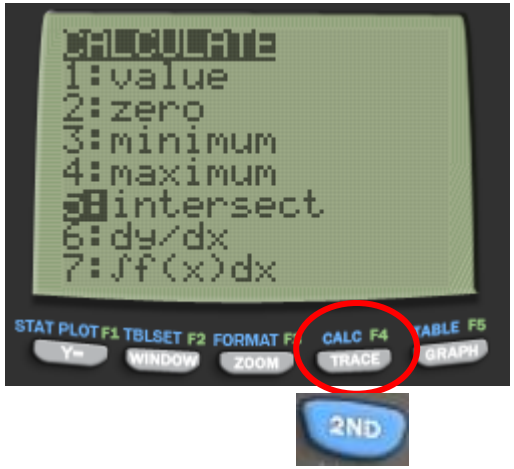
Solve

$$\sin(x) = \frac{1}{2}(x - 1) \quad \text{for } 0 \leq x \leq \pi$$

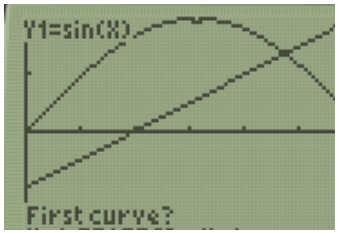
1. Input both graphs

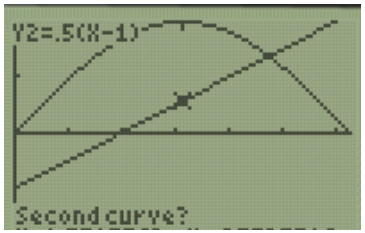


2. Find the intersection

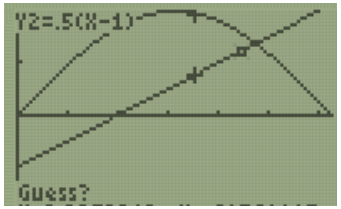


(You may want to adjust the window first)





Press enter on both curves



Press enter on a point near the solution.

You can use left/right arrow keys or input a number using the numerical keys.

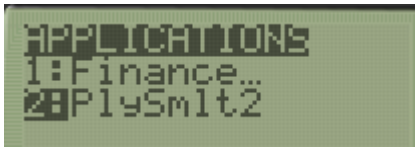
g3

Find the roots of the function

$$f(x) = x^3 + 2x^2 - 1$$

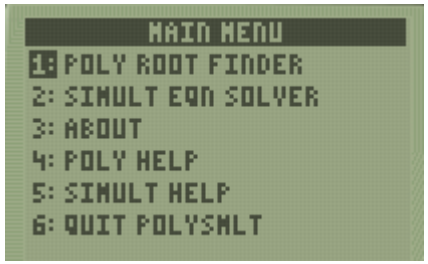
Remember, 'roots' are the same as finding the 'zeroes' or ;x-intercepts; of a function

1. Load the PlySmlt app



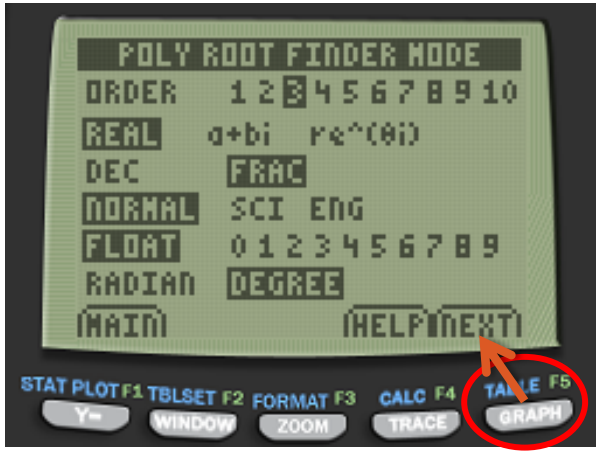
You can use PlySmlt to solve equations where the function is a polynomial
(only contains powers of x, i.e. no sin(x), e^x etc.)

2. Select the Poly Root Finder

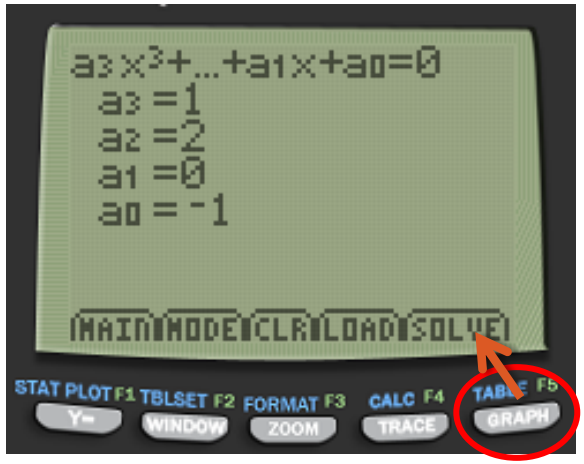


Remember that 'zeroes' and 'roots' are the same thing

3. Input the function and solve

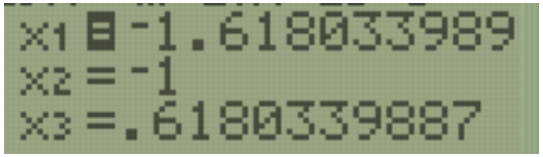


Options at the bottom use main calculator buttons



Make sure to include any coefficients which are 0.

Press solve when complete



g4

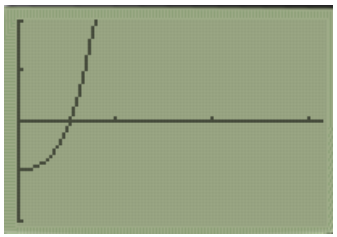
Find the roots of the function

$$f(x) = xe^{2x} - x - 1$$

Remember, equations involving $e^x, \sin(x), \ln(x), etc.$ are not polynomials, so you can't use plysmlt.

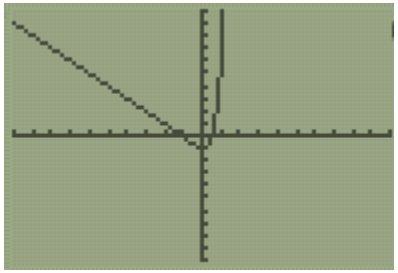
1. Input the graph

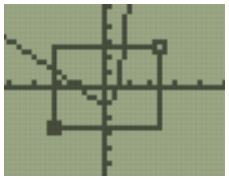
2. Adjust the window



I can only see one solution, there might be more.

Zooming to the 'standard' view might help

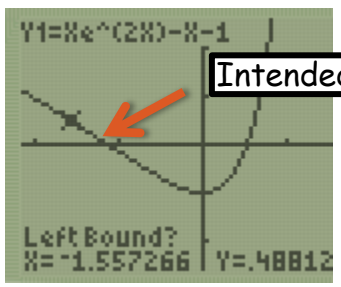


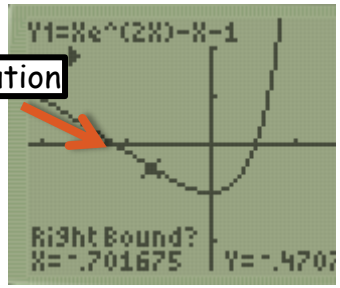


You can also draw a box around where you want the graph to show. Move with the direction keys and press enter at 2 corner points

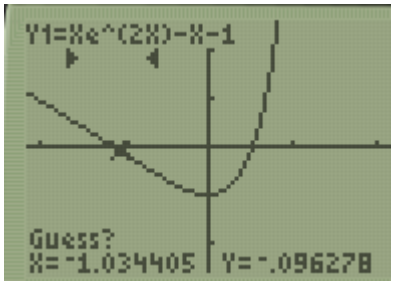
3. Calculate the 'zeroes'

'zeroes' are where **y=0**, where graph **crosses x-axis**, and the **roots** of an equation





Select two points either side of the solution



Select a value near the solution

Repeat for other solutions

g5

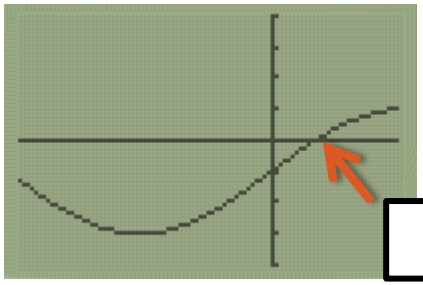
Find the total area between the curve $y = 2\sin(3x) - 1$, the x-axis, and the lines x=-1 and x=0.5

1. Input the graph

2. Adjust the window

Make sure you are in **radians!**

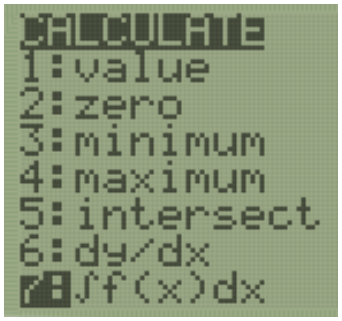
3. Work out the limits

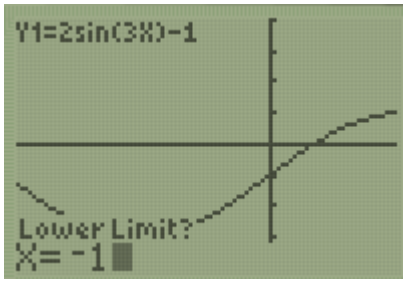


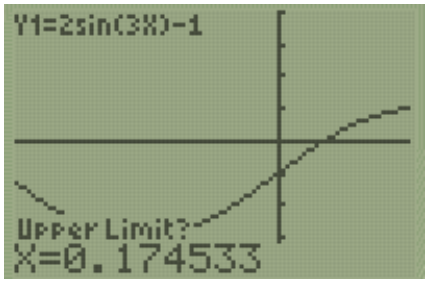
Part of the graph is below the x-axis and part is above. Therefore the integration will need to be done in 2 stages.

Zero when x= 0.174533 found using GDC

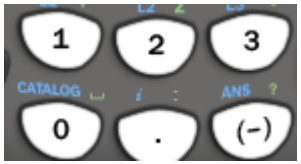
4. Integrate

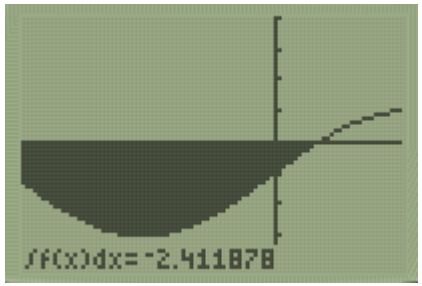






Input the limits using the **number keys**





Repeat for second part

g6

The region $y = e^{\sin(x)} - 2$ enclosed by the lines x=2 and x=5 is revolved 360° around the x-axis. Find the volume.

1. Calculate the function to be integrated

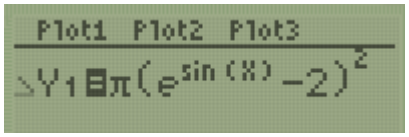
$y = e^{\sin(x)} - 2$

For volume of revolutions we must take $\int \pi y^2 \, dx$.

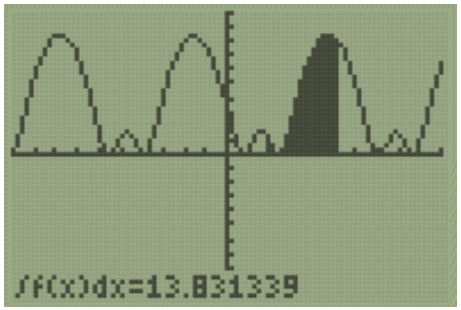
$\pi y^2 = \pi\left(e^{\sin(x)} - 2\right)^2$

You don't need to work this out by hand!
Type it directly into the calculator

2. Input



3. Integrate

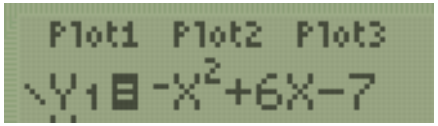


You may need to adjust your window to ensure the region of the graph used all fits in

g7

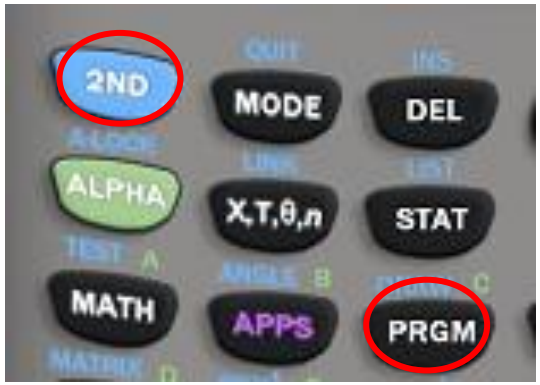
Find the equation of the tangent to the line $f(x) = -x^2 + 6x - 7$ at the point (4,1).

1. Input Graph

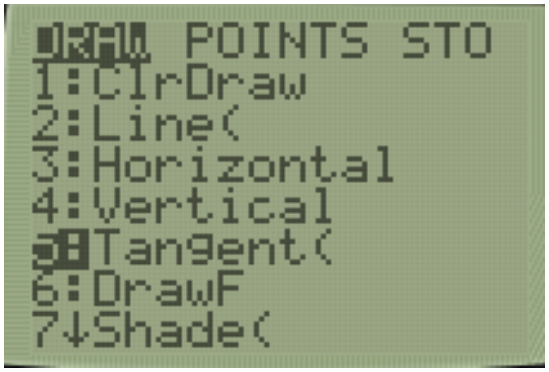


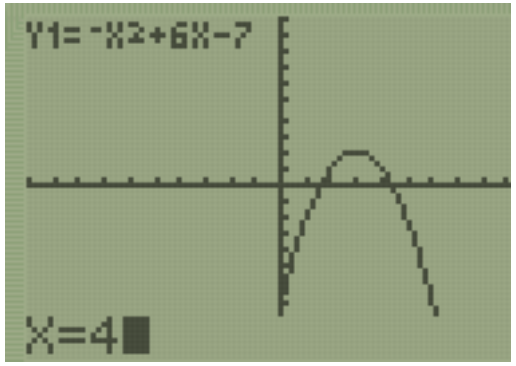
2. Adjust the window

3. 'Draw' the tangent

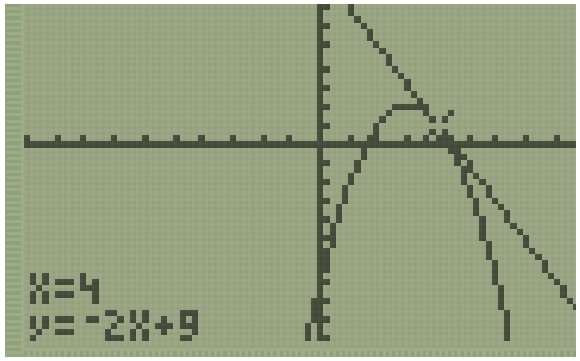


Use 2nd -> PRGM to access draw menu





Use number pad to input x-coordinate

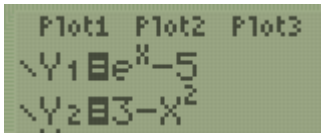


Tangent is drawn and equation displayed in bottom-left corner

g8

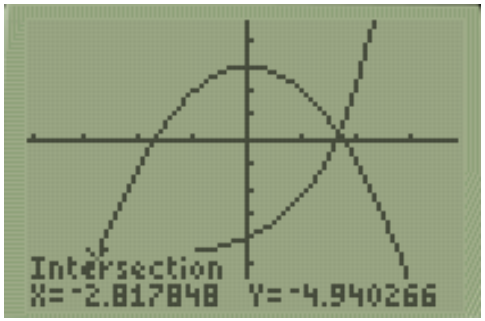
Find the area bounded by the curves $y = e^x - 5$ and $y = 3 - x^2$

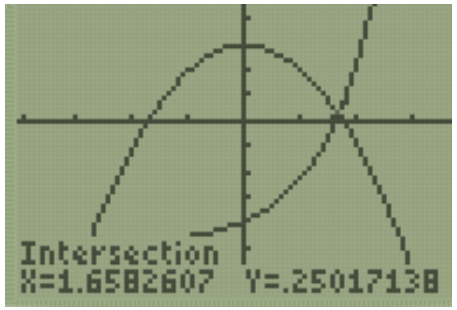
1. Input both graphs



2. Adjust the window

3. Calculate the intersection points



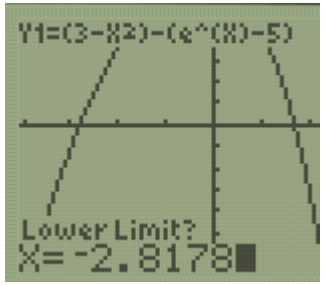


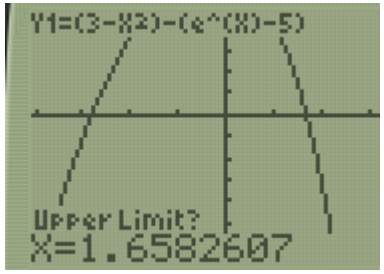
4. Write down the integral that represents the area

$$\int_{-2.817848}^{1.6582607} (3 - x^2) - (e^x - 5)$$

The area between the two curves is given by the integral of the top function - bottom function

4. Evaluate on GDC





s1

Calculate the mean and standard deviation of the following data

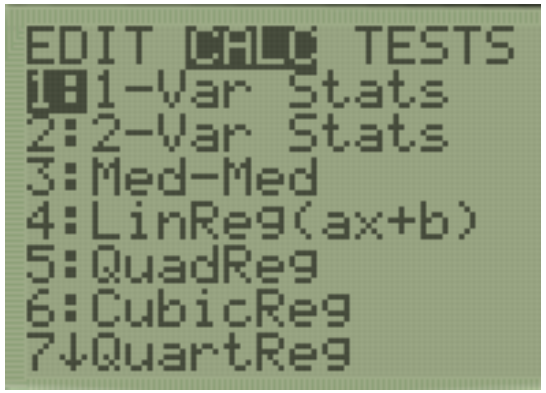
Mass of eggs	Frequency
[100,120[	26
[120,140[	52
[140,160[	84
[160,180[	60
[180,200[	12

1. Input data into lists

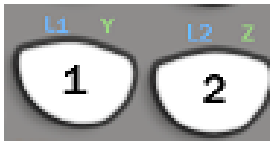
If you have grouped data you must use the midpoint

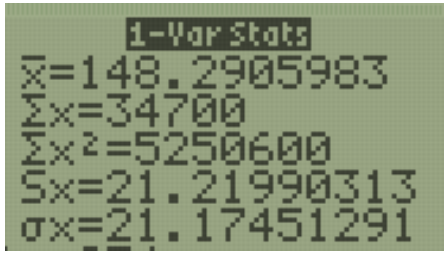
L1	L2
110	26
130	52
150	84
170	60
190	12

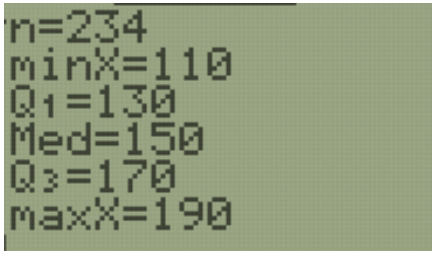
2. Calculate 1-variable statistics



If you need to type in a different list number, they can be found above number keys







Mean = $\bar{x}$

S.D = σx

s2

For the data below calculate the equation of linear regression

Score in maths test (M)	Number of hours spent revising (R)
42	1.0
50	1.25
67	2.0
71	2.3
92	3.0

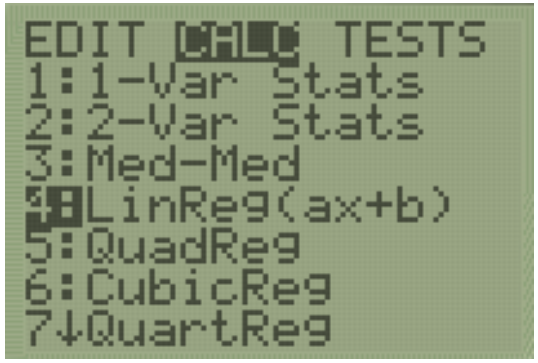
1. Decide which is independent variable (x) and which is dependent (y)

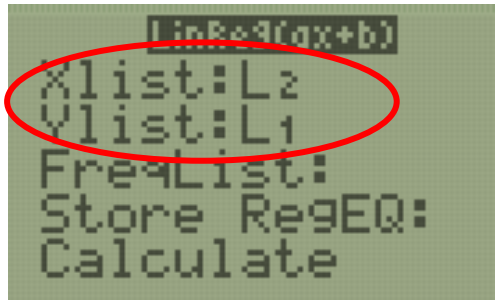
Score in maths test (M)	Number of hours spent revising (R)
Dependent (y)	Independent (x) - we can control this

2. Input data into lists

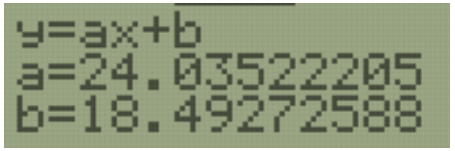
L1	L2
42	1
50	1.25
67	2
71	2.3
92	3

3. Calculate regression stats





Important you get these correct!!!



Y=24.0x + 18.5

M=24.0R + 18.5

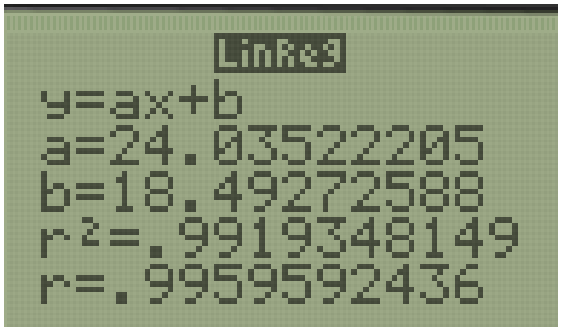
s3

For the data below calculate the product-moment correlation coefficient

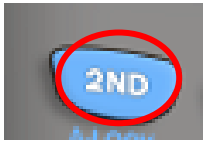
Score in maths test (M)	Number of hours spent revising (R)
42	1.0
50	1.25
67	2.0
71	2.3
92	3.0

1. Use same method as previous question.

If diagnostics are enabled it will show the value for r and r^2



If it does not, you must turn on diagnostics



Use 2nd -> 0 to access catalog

Scroll down till you find 'DiagnosticsOn'

Press Enter twice to turn diagnostics on

Evaluate $\binom{8}{3}$

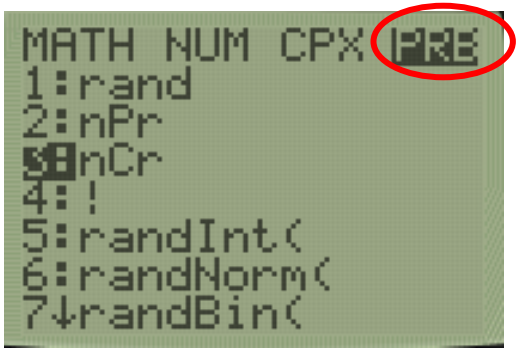
Method 1

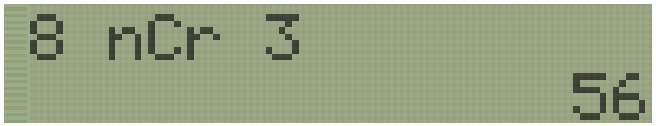
Draw Pascal's triangle and locate 4th number in 8th row (remember we start counting at $\binom{8}{0}$)

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1
1 7 21 35 35 21 7 1
1 8 28 56 70 56 28 8 1

Method 2

Use nCr function from the math probability menu





Method 3

Use formula $\frac{n!}{r!(n-r)!}$

s5

Anna shoots at a target 15 times. The probability she hits is 0.6. Calculate the probability she hits the target more than 5 but less than 11 times

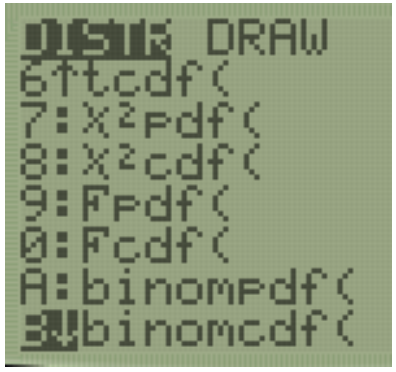
1. State the Distribution

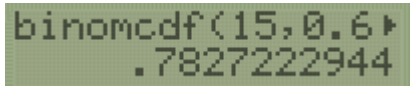
$$X \sim B(15, 0.6)$$

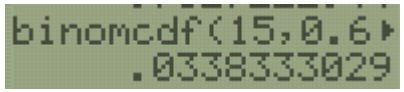
Binomial distribution: fixed number of trials,
2 outcomes,
fixed probability

2. Calculate probabilities

To calculate the probability of an exact number of times use BinomialPDF
To calculate a range of values use BinomialCDF







BinomialCDF finds probabilty the score is **less than or equal to** a value

$$P(5 < x < 11) = P(x \leq 10) - P(x \leq 5)$$

x can be 6, 7, 8, 9 or 10 $= 0.7827 - 0.0338 = \mathbf{0.749}$

s6

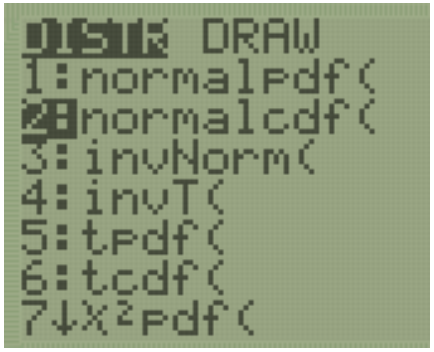
The average height of people in a town is 170cm, and the standard deviation is 10cm. What is the probability a randomly selected person is taller than 176cm?

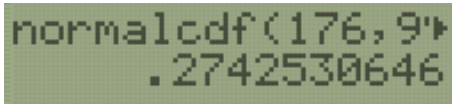
1. State the Distribution

$$X \sim N(170, 10^2)$$

2. Calculate probabilities

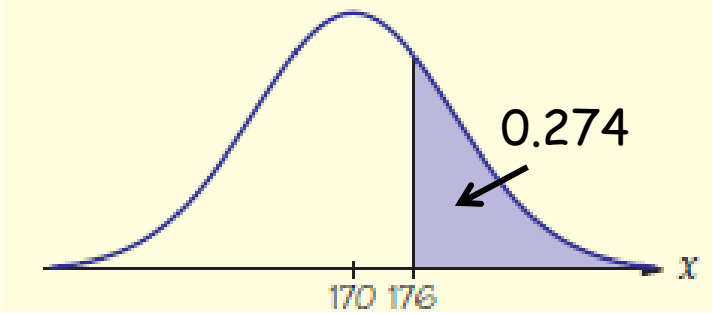
The range of heights (>176cm) means you must use NormalCDF





Remember, normal distributions are continuous and the data does not have defined max and min values.

Therefore when you put in lower or upper bounds, use suitably large or small numbers for increased accuracy

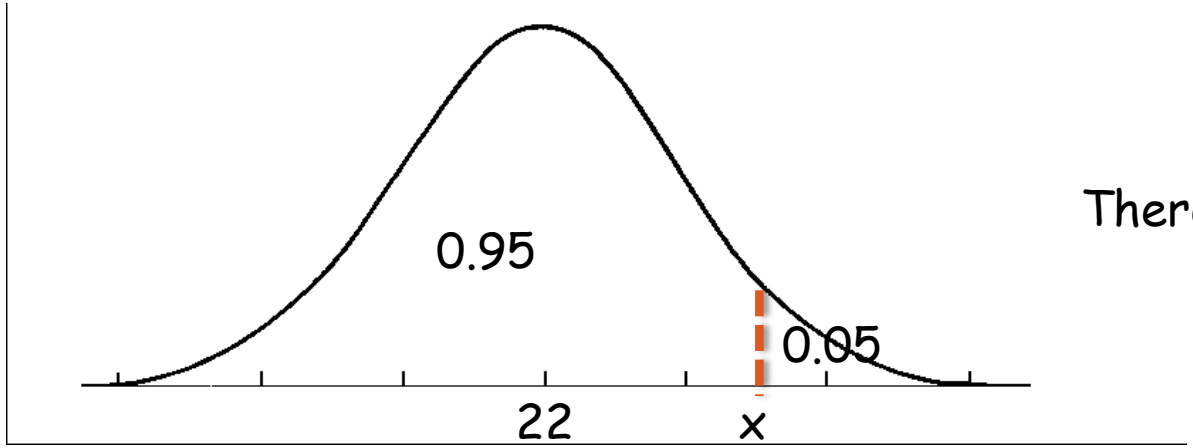


s7 X is assumed to be normally distributed with mean 22 and variance 25. Find the value of X such that $P(X > x) = 0.05$

1. State the Distribution

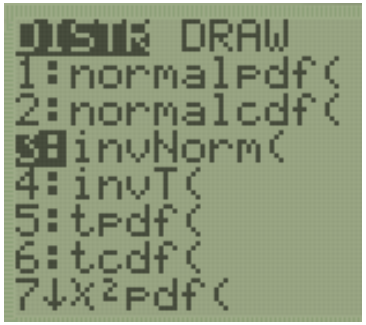
$$X \sim N(22, 5^2)$$

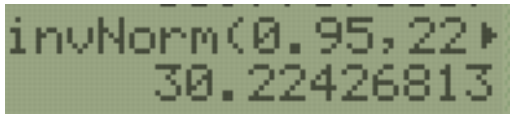
2. Use the inverse normal function to find the value which gives specified area



$P(X > x = 0.05$

Therefore $P(X \leq x) = 0.95$





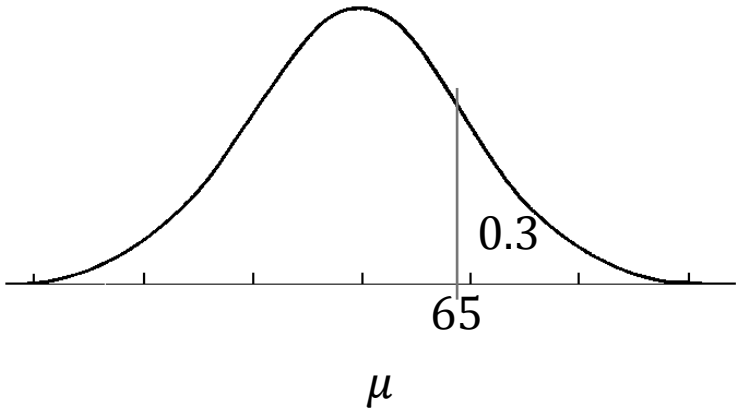
s8

The mass of gerbils is thought to be normally distributed with standard deviation 8.3g. It is found 30% have mass more greater than 65g. Estimate the mean.

1. State the Distribution

$$X \sim N(\mu, 8.3^2)$$

2. Work out what needs to be calculated



Each standard deviation is 8.3g

We need to know how many standard deviations leave 30% of data to the right

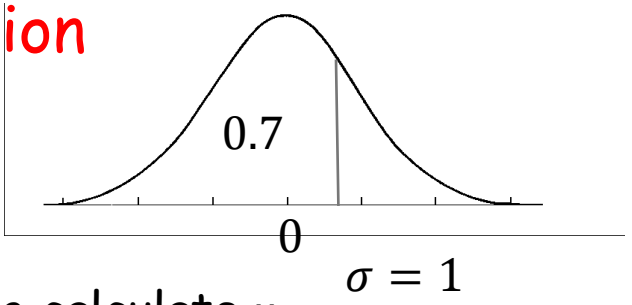
$P(x \leq 65) = 0.7$

Probability to the left of the line

Need to find value for mean that satisfies the above

3. Convert to standardised distribution

$P(Z \leq z) = 0.7$



$z = 0.524$ Use inverse normal

$z = \frac{x-\mu}{\sigma}$ Formula – rearrange to calculate μ

$\mu = 60.6g$ Formula – rearrange to calculate μ