A Finding probabilities in the *t*-distribution

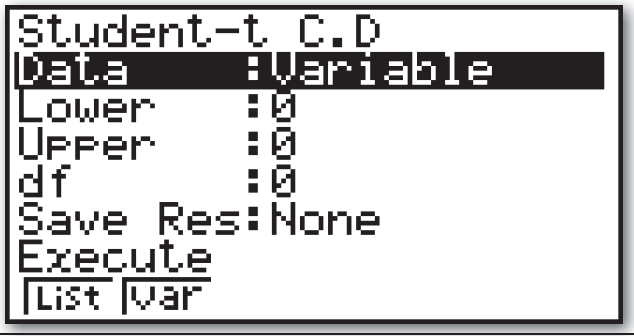
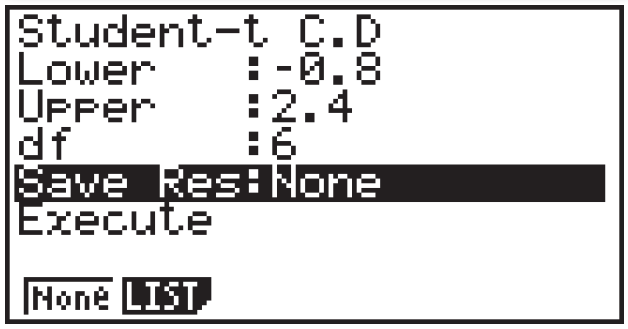
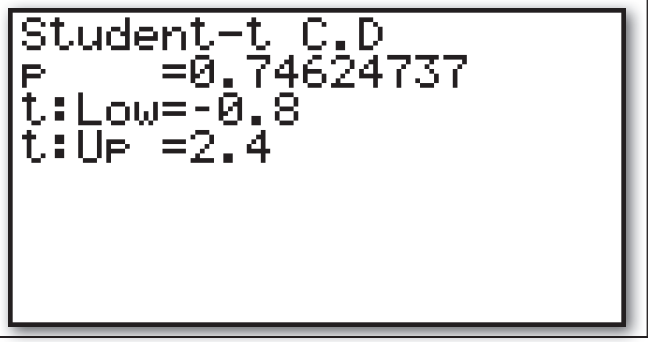
You will need...

- the number of degrees of freedom
- the interval of interest in terms of T.

In our example...

- 6
- [-0.8,2.4].

How to do it...

Notes	*You should press*	*You will see*
To get to the correct menu	MENU 2 (STAT) F5 (DIST) F2 (t) F2 (tcd) F2 (Var)	
Enter limits and degrees of freedom	▼ (−) 0 • 8 EXE 2 • 4 EXE 6 EXE	
Calculate	EXE	

What to write down...

If $X \sim t_6$, $P(-0.8 \leq X \leq 2.4) = 0.746$ (3SF from GDC).

* These instructions were written based on the CASIO model fx9860G SD and might not be true for other models. If in doubt, refer to your calculator's manual.

B Finding *t*-scores given probabilities

You will need...

- the number of degrees of freedom, ν
- the probability, $P(T > t)$.

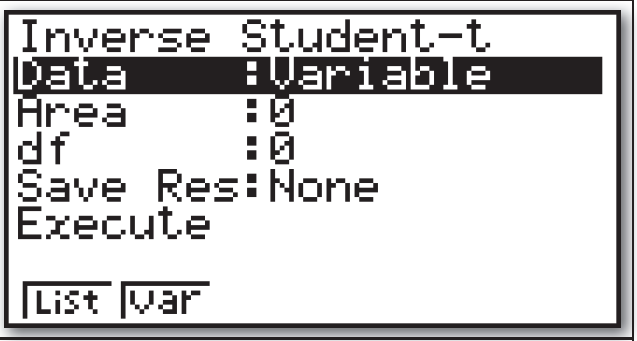
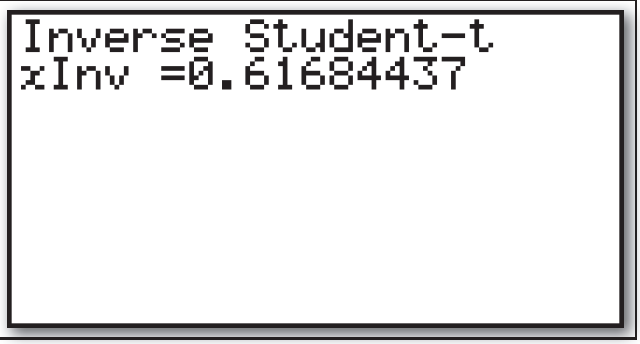
In our example...

- 6
- 0.28.

EXAM HINT

Notice that we use $P(T > t)$ rather than the more common cumulative probability $P(T \leq t)$

How you do it...

Notes	*You should press*	*You will see*
To get to the correct menu	MENU 2 (STAT) F5 (DIST) F2 (t) F3 (Invt) F2 (Var)	
Enter $P(T > t)$ in Area	▼ 0 • 2 8 EXE	
Enter degrees of freedom and find *t*-score	6 EXE EXE	

What to write down...

If $X \sim t_6$ and $P(X > x) = 0.28$ then $x = 0.617$ (3SF from GDC).

* These instructions were written based on the CASIO model fx9860G SD and might not be true for other models. If in doubt, refer to your calculator's manual.

C Confidence interval for the mean with unknown variance (from data)

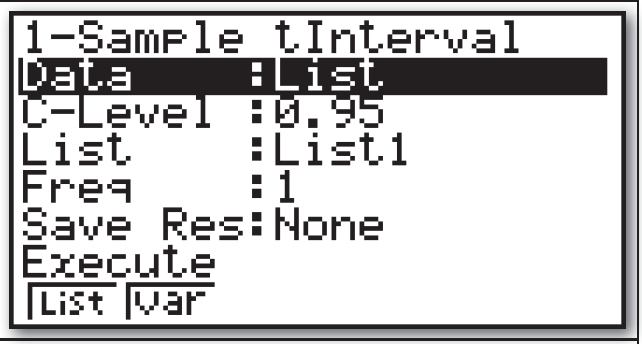
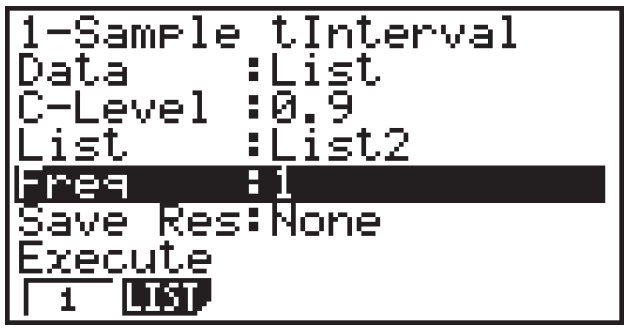
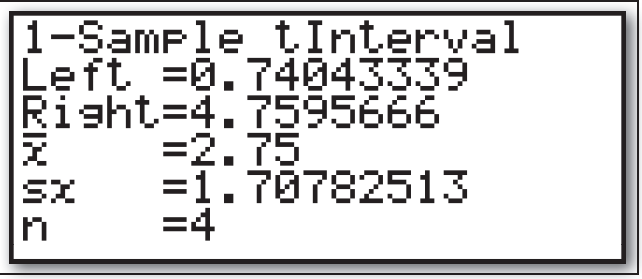
You will need...

- the sample stored in a list (see Calculator sheet 11)
- the confidence level.

In our example...

- {1,3,5,2} stored in List 2
- 90%.

How you do it...

Notes	*You should press*	*You will see*
To get to the correct menu (make sure you change to 'List' from 'variable' if you need to)	MENU 2 (STAT) F4 (INTR) F2 (t) F1 (1-S)	
Remember that the confidence level must be input as a decimal	▼ 0 • 9 EXE	
Select which list your data are stored in	F1 (LIST) 2 EXE	
You can then say if the frequencies are stored in another list, or if the frequency of each item is 1	▼ F1 (1)	
Find the interval	▼ ▼ EXE	

What to write down...

$$\bar{x} = 2.75, s_{n-1} = 1.71$$

Using t_3 distribution $0.740 < \mu < 4.76$ (3SF from GDC).

* These instructions were written based on the CASIO model fx9860G SD and might not be true for other models. If in doubt, refer to your calculator's manual.

D Confidence interval for the mean with unknown variance (from stats)

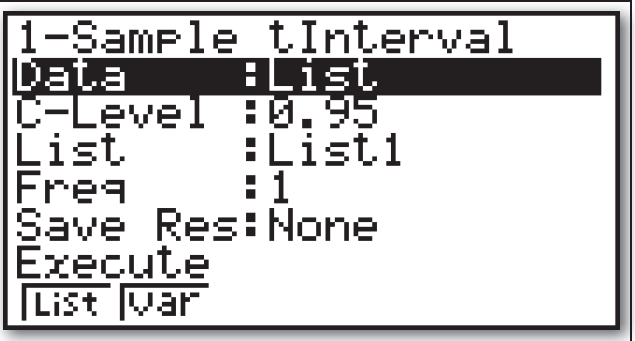
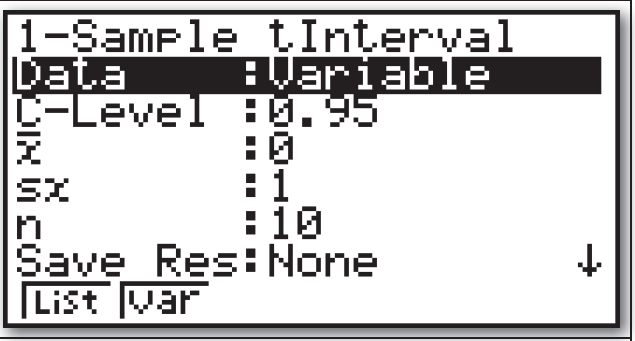
You will need...

- the sample mean $(\bar{x})$
- unbiased estimate of population standard deviation (s_{n-1})
- the confidence level.
- the number of data items (n)

In our example...

- 2.75
- 1.707825128
  (stored exactly in A)
- 90%
- 4

How you do it...

Notes	*You should press*	*You will see*
To get to the correct menu	DEL 2 (STAT) F4 (INTR) F2 (t) F1 (1-S)	
To change entry to statistics (variable)	F2 (VAR)	
Remember that the confidence level must be input as a decimal	▼ 0 • 9 EXE	
Enter $\bar{x}$	2 • 7 5 EXE	
Enter standard deviation	ALPHA X,θ,T (A) EXE	
Enter n	4 EXE	

instructions continue on next page ⟶

* These instructions were written based on the CASIO model fx9860G SD and might not be true for other models. If in doubt, refer to your calculator's manual.

continued ...

You can then tell the calculator to find the interval	▼ EXE	1-Sample tInterval Left =0.74043339 Right=4.7595666 $\bar{x}$ =2.75 sx =1.70782513 n =4

What to write down...

Using the t distribution with $\nu = 3$: $0.740 < \mu < 4.76$ (3SF from GDC).

E Hypothesis test for the mean with unknown variance (from data)

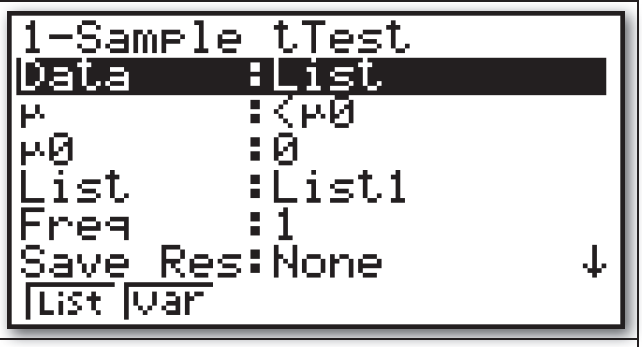
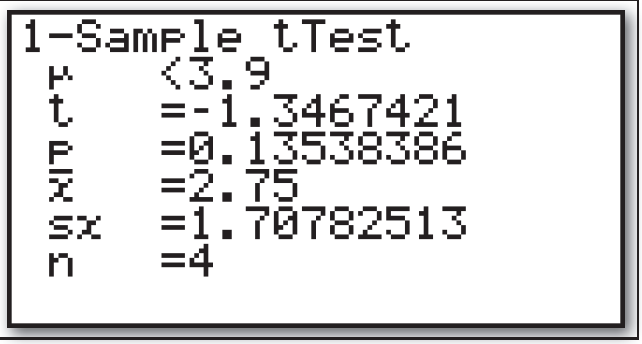
You will need...

- the sample stored in a list (see 'Calculator skills sheet 11' on the CD-ROM)
- the mean under the null hypothesis (μ_0)
- the alternative hypothesis.

In our example...

- {1,3,5,2} stored in List 2
- 3.9
- $\mu < \mu_0$.

How you do it...

Notes	*You should press*	*You will see*
To get to the correct menu	DEL 2 (STAT) F3 (TEST) F2 (t) F1 (1-S)	
Set the direction of the alternative hypothesis	▼ F2 (<)	
Enter the value of the mean under the null hypothesis	▼ 3 • 9 EXE	
Select which list your data are stored in	F1 (LIST) 2 EXE	
You can then say if the frequencies are stored in another list, or if the frequency of each item is 1	▼ F1 (1)	
You can then tell the calculator to conduct the test	▼ ▼ EXE	

* These instructions were written based on the CASIO model fx9860G SD and might not be true for other models. If in doubt, refer to your calculator's manual.

What to write down...

Under H_0, $T = \dfrac{\bar{x} - 3.9}{\sqrt{s_{n-1}/n}} \sim t_{n-1}$.

$$\bar{x} = 2.75, s_{n-1} = 1.71, \nu = 3, T = -1.35$$

$$p \text{ value} = 0.135$$

F Hypothesis test for the mean with unknown variance (from stats)

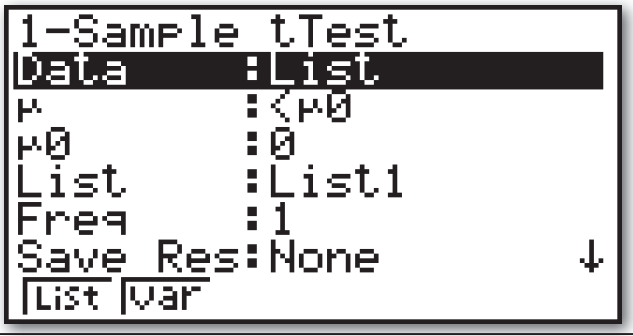
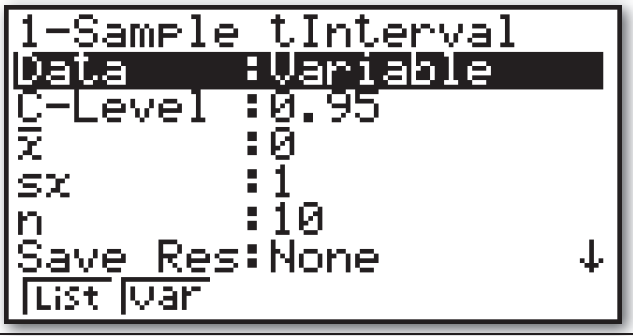
You will need...

- the sample mean $(\bar{x})$
- unbiased estimate of population standard deviation (s_{n-1})
- the number of data items (n)
- the mean according to the null hypothesis (μ_0)
- the alternative hypothesis

In our example...

- 2.75
- 1.707825128
  (stored exactly in A)
- 4
- 3.9
- $\mu < \mu_0$

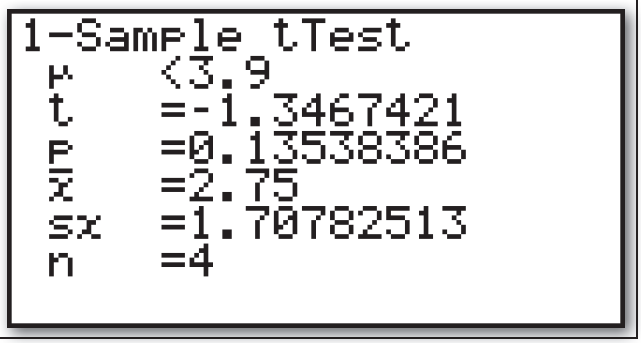
How you do it...

Notes	*You should press*	*You will see*
To get to the correct menu	DEL 2 (STAT) F3 (TEST) F2 (t) F1 (1-S)	
To change entry to statistics	F2 (VARS)	
Set the direction of the alternative hypothesis	▼ F2 (<)	
Enter the value of the mean under the null hypothesis	▼ 3 • 9 EXE	
Enter $\bar{x}$	2 • 7 5 EXE	
Enter standard deviation	ALPHA X,θ,T (A) EXE	

instructions continue on next page ⟶

* These instructions were written based on the CASIO model fx9860G SD and might not be true for other models. If in doubt, refer to your calculator's manual.

continued ...

Enter n	4 EXE	
You can then tell the calculator to conduct the test	▼ ▼ EXE	

What to write down...

Under H_0, $T = \dfrac{\bar{x} - 3.9}{\sqrt{s_{n-1}/n}} \sim t_{n-1}$.

$$T = -1.35, \nu = 3$$

$$p \text{ value} = 0.135$$

G Confidence interval for the mean with known variance (from data)

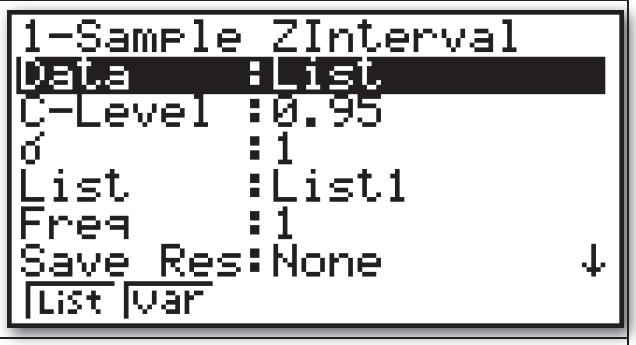
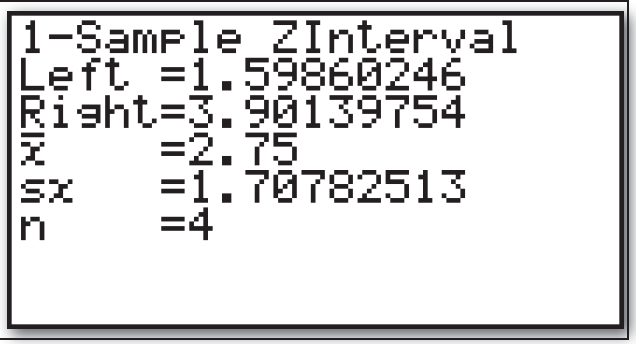
You will need...

- the sample stored in a list
- the population standard deviation (σ)
- the confidence level.

In our example...

- {1,3,5,2} stored in List 2
- 1.4
- 90%.

How you do it...

Notes	*You should press*	*You will see*
To get to the correct menu	DEL 2 (STAT) F4 (INTR) F1 (Z) F1 (1-S)	
Remember that the confidence level must be input as a decimal	▼ 0 • 9 EXE	
You will automatically move to input σ	1 • 4 EXE	
Select which list your data are stored in	F1 (LIST) 2 EXE	
You can then say if the frequencies are stored in another list, or if the frequency of each item is 1	▼ F1 (1)	
You can then tell the calculator to find the interval	▼ ▼ EXE	

What to write down...

Using normal distribution:

$$\bar{x} = 2.75$$

$$1.60 < \mu < 3.90 \text{ (3SF from GDC).}$$

* These instructions were written based on the CASIO model fx9860G SD and might not be true for other models. If in doubt, refer to your calculator's manual.

H Confidence interval for the mean with known variance (from stats)

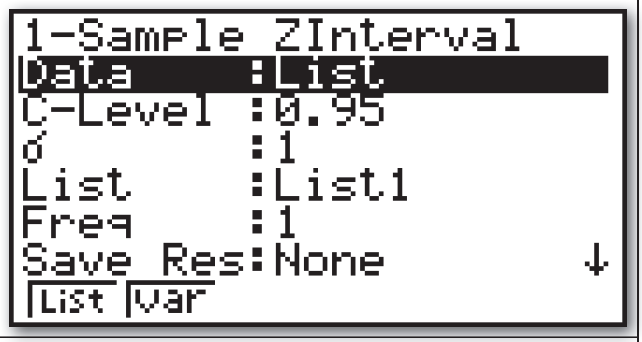
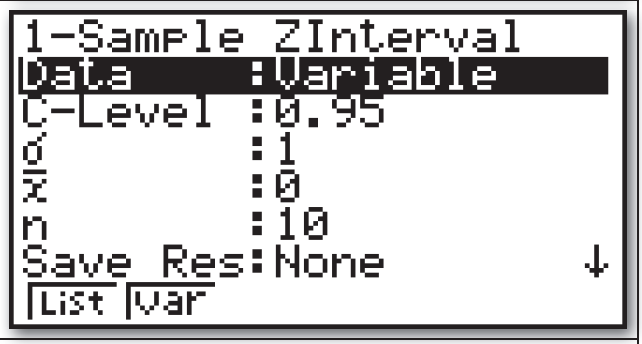
You will need...

- the sample mean ($\bar{x}$)
- the population standard deviation (σ)
- the number of data items (n)
- the confidence level

In our example...

- 2.75
- 1.4
- 4
- 90%.

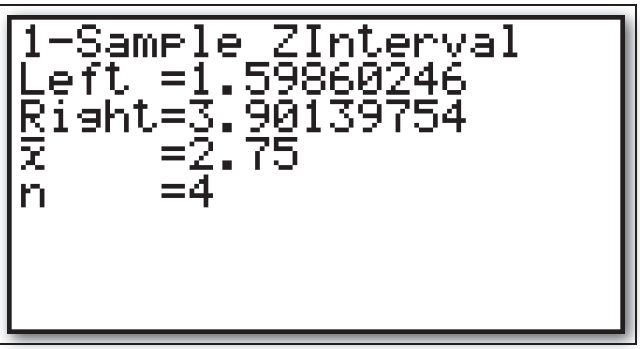
How you do it...

Notes	*You should press*	*You will see*
To get to the correct menu	MENU 2 (STAT) F4 (INTR) F1 (Z) F1 (1-S)	
Set input mode to variables	F2 (Var)	
Remember that the confidence level must be input as a decimal	▼ 0 • 9 EXE	
Enter σ	1 • 4 EXE	
Enter $\bar{x}$	2 • 7 5 EXE	
Enter n	4 EXE	

instructions continue on next page ⟶

* These instructions were written based on the CASIO model fx9860G SD and might not be true for other models. If in doubt, refer to your calculator's manual.

continued ...

You can then tell the calculator to find the interval	▼ EXE	

What to write down...

Using normal distribution:

$$1.60 < \mu < 3.90 \text{ (3SF from GDC).}$$

I Hypothesis test for the mean with known variance (from stats)

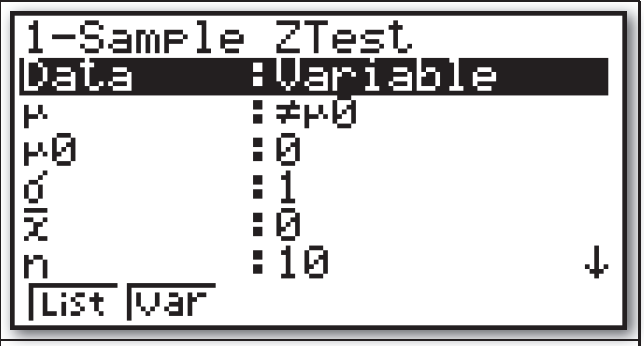
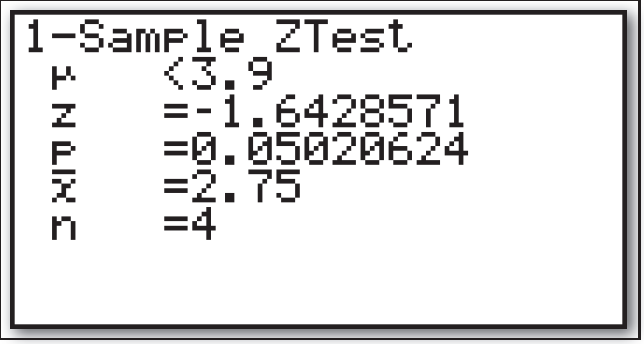
You will need...

- the sample mean ($\bar{x}$)
- the population standard deviation (σ)
- the number of data items (n)
- the mean according to the null hypothesis (μ_0)
- the alternative hypothesis.

In our example...

- 2.75
- 1.4
- 4
- 3.9
- $\mu < \mu_0$.

How you do it...

Notes	*You should press*	*You will see*
To get to the correct menu	MENU 2 (STAT) F3 (TEST) F1 (Z) F1 (1-S) F2 (Var)	
Set the direction of the alternative hypothesis	▼ F2 (<)	
Enter the value of the mean under the null hypothesis	▼ 3 • 9 EXE	
Enter σ	1 • 4 EXE	
Enter $\bar{x}$	2 • 7 5 EXE	
Enter n	4 EXE	
You can then tell the calculator to perform the test	▼ EXE	

What to write down...

Under H_0, $Z = \dfrac{\bar{x} - 3.9}{\sqrt{1.4/4}} \sim N(0,1)$

$$Z = -1.64$$

$$p \text{ value} = 0.0502$$

* These instructions were written based on the CASIO model fx9860G SD and might not be true for other models. If in doubt, refer to your calculator's manual.

J Finding the correlation coefficient and the equation of the regression line

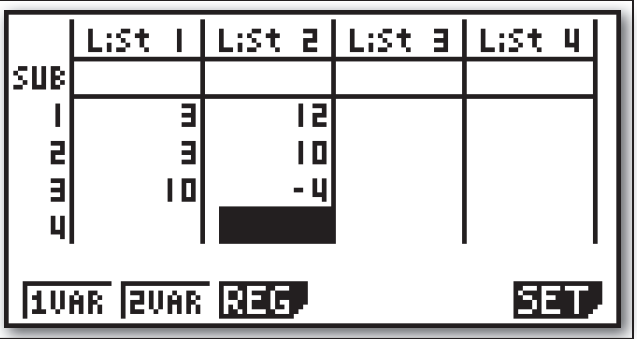
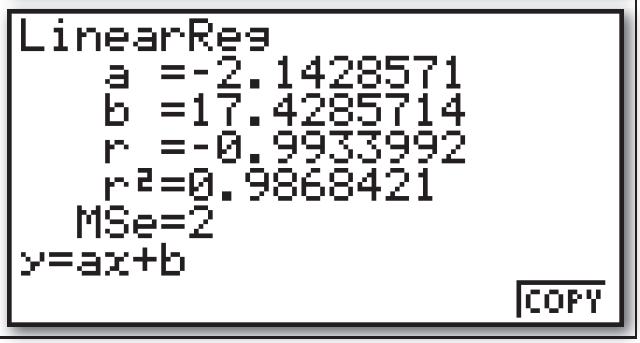
You will need...

- the x-data stored in list 1
- the y-data stored in list 2.

In our example...

- {3, 3, 10}
- {12, 10, –4}.

How you do it...

Notes	*You should press*	*You will see*
Go to the statistics menu then the calculation submenu	MENU 2 (STAT) F2 (CALC)	
Select the regression option then x	F3 (REG) F1 (x)	

What to write down...

From GDC $r = -0.993$ and $y = -2.14x + 17.4$.

* These instructions were written based on the CASIO model fx9860G SD and might not be true for other models. If in doubt, refer to your calculator's manual.