

# Dr Oliver Mathematics

## Trial and Improvement

In this note, we will consider trial and improvement.

1. The equation

$$x^3 - 5x = 38$$

has a solution between 3 and 4.

Use trial and improvement method to find this solution.

Give your answer correct to 1 decimal place.

You must show all your working.

### Solution

You must be in **TABLE** mode; on my calculator (Casio fx-991) it is **MODE** **3**.

**F(X)=** and you type in  $X^3 - 5X$ ; then you press **=**.

**Start?** and you enter 3; then you press **=**.

**End?** and you enter 4; then you press **=**.

**Step?** and enter 0.05 – 1 decimal place divided by 2; then you press **=**.

You get a table.

	X	F(X)
1	3	12
2	3.05	13.122
3	3.1	14.291
	⋮	
18	3.85	37.816
19	3.9	39.819
20	3.95	41.879
21	4	44

All you need to copy down is the lines 18 and 19 and make an appropriate comment:

$x$	$f(x)$	Comment
3.85	37.816	too low
3.9	39.819	too high

Clearly,

$$3.85 < x < 3.9$$

and the answer is

$$\underline{\underline{x = 3.9 \text{ (1 dp)}}}.$$

2. The equation

$$x^3 + 10x = 25$$

has a solution between 1 and 2.

Use trial and improvement method to find this solution.

Give your answer correct to one decimal place.

You must show all your working.

### Solution

**F(X)**= and you type in  $X^3 + 10X$ ; then you press  $\boxed{=}$ .

**Start?** and you enter 1; then you press  $\boxed{=}$ .

**End?** and you enter 2; then you press  $\boxed{=}$ .

**Step?** and enter 0.05 – 1 decimal place divided by 2; then you press  $\boxed{=}$ .

$x$	$f(x)$	Comment
1.85	24.831	too low
1.9	25.859	too high

Clearly,

$$1.85 < x < 1.9$$

and the answer is

$$\underline{\underline{x = 1.9 \text{ (1 dp)}}}.$$

They are not *all* .9 ...

3. The equation

$$x^3 - 6x = 72$$

has a solution between 4 and 5.

Use trial and improvement method to find this solution.

Give your answer correct to one decimal place.

You must show all your working.

**Solution**

**F(X)=** and you type in  $X^3 - 6X$ ; then you press [=].

**Start?** and you enter 4; then you press [=].

**End?** and you enter 5; then you press [=].

**Step?** and enter 0.05; then you press [=].

$x$	$f(x)$	Comment
4.6	69.736	too low
4.65	72.644	too high

Clearly,

$$4.6 < x < 4.65$$

and the answer is

$$\underline{x = 4.6 \text{ (1 dp)}}.$$

And then you press [MODE] [1] – on my calculator, it says [COMP] – and you can do the next question.