

## 7.4 Solving Equations and Inequalities

### Method 1: "Guess and Test" to Solve an Equation

- use when an algebraic solution is not possible
- rearrange the equation so one side equals zero
- estimate a value that will be a zero and test it in the equation
- refine the estimate to get a value closer to zero
- repeat...repeat...repeat... to indicated degree of accuracy

Example 1:

Use a guess and test strategy to solve to the nearest tenth in the given interval.

a)  $2\cos x = 5x^2 - 7x - 3$  ,  $0 \leq x \leq 4$

-1.4  
check  
restrictions

x	y
0	5
1	6.08
2	-3.83
1.5	2.39
1.6	1.34
1.7	0.19
1.8	-1.04

$2\cos x - 5x^2 + 7x + 3 = 0$

Because we are limited to the nearest tenth of  $x$ ,  $\therefore x = 1.7$

b)  $\frac{x}{x-4} = 3 \log x$  ,  $x \in (4, 8]$

$4 < x \leq 8$

x	y
6	0.67
7	-0.20
6.5	0.16
6.6	0.08
6.7	0.003
6.8	-0.07

$\frac{x}{x-4} - 3 \log x = 0$

$x = 6.7$

### Method 2: Using Graphing Technology to Solve an Equation

Option A:

Graph the LS and RS as separate equations and determine their point of intersection.

OR

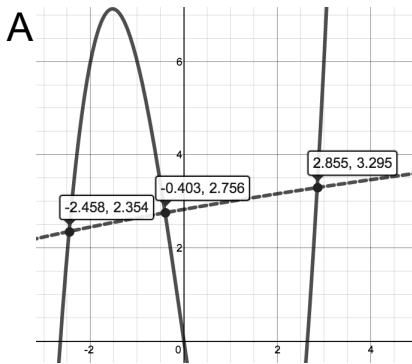
Option B:

Rearrange the equation so one side equals zero and determine the zeros.

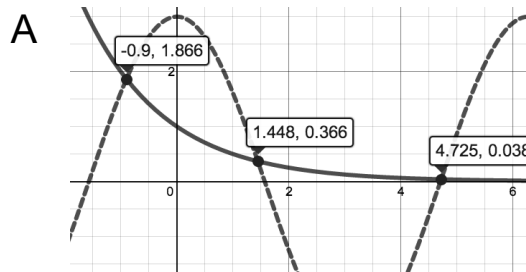
Example 2: Solve using graphing technology.

a)  $\sqrt{x+8} = x^3 - 7x$

b)  $3\cos x = (\frac{1}{2})^x, 0 \leq x \leq 6$

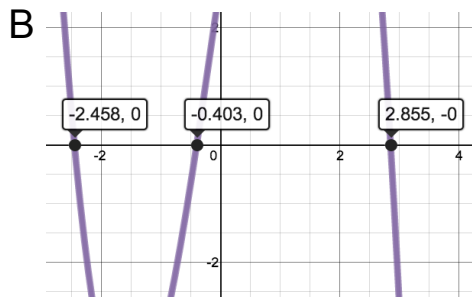


$x = -2.5, -0.4, 2.9$

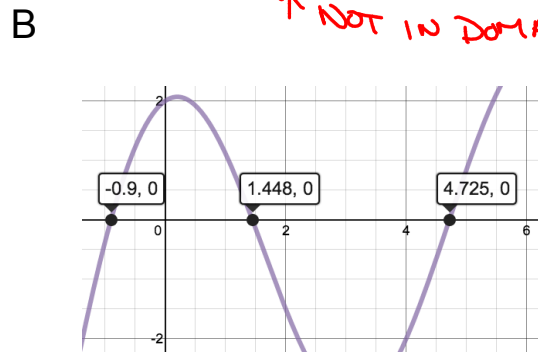


$x = -0.9, 1.5, 4.7$

↑ NOT IN DOMAIN



$x = -2.5, -0.4, 2.9$



$x = \{1.5, 4.7\}$

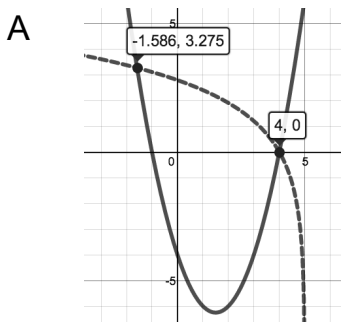
**Method 3: Using Graphing Technology to Solve an Inequality**

<p><u>Option A:</u> Graph the LS and RS as 2 different functions and determine the intervals in which one is above/below the other. (need pt. of intersection)</p>	OR	<p><u>Option B:</u> Rewrite as a single function and determine the intervals in which the function is above/below the x-axis. (need zeros)</p>
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Example 3: Solve using graphing technology.

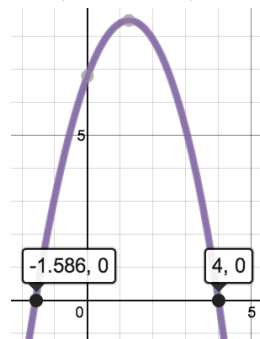
$$4\log(5-x) \leq x^2 - 3x - 4$$

hint: watch the restriction on x



B

$$4\log(5-x) - x^2 + 3x + 4 \leq 0$$



Intersections are -1.6, 4

$$x \leq -1.6 \quad x \geq 4$$

When is  $x^2 - 3x - 4$  Bigger?

$$x \leq -1.6, \quad x \geq 4$$

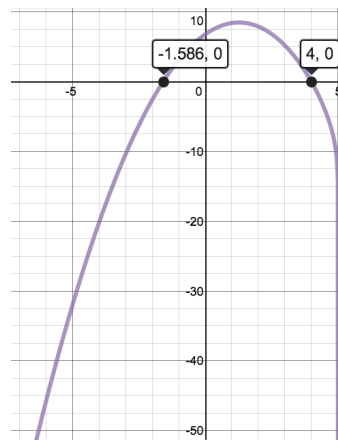
Right? oops!

Restriction on LOG

$$\begin{aligned} 5-x > 0 \\ -x > -5 \\ x < 5 \end{aligned}$$

So....

$$x \leq -1.6, \quad 4 \leq x < 5$$



See? →

$$\therefore x \leq -1.6 \text{ \& } 4 \leq x < 5$$

And NOW for something <sup>a little</sup> ~~completely~~ different:

Example 4: Solve algebraically.

$$\frac{54\,000 (0.84)^x}{54\,000} = \frac{43\,000 (0.92)^x}{54\,000}$$

How?  
- Isolate x!

$$(0.84)^x = \frac{43}{54} (0.92)^x$$

$$\frac{(0.84)^x}{(0.92)^x} = \frac{43}{54}$$

$$\left(\frac{0.84}{0.92}\right)^x = \frac{43}{54}$$

$$x \log\left(\frac{0.84}{0.92}\right) = \log\left(\frac{43}{54}\right)$$

\* Now that we have isolated x, we take the log of both sides.

$$x = \frac{\log \frac{43}{54}}{\log \frac{0.84}{0.92}}$$

$$= 2.5$$

Homework

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#3,6,9 ...need G.C.

#1,2,4,5,8 without G.C.

