

Homework No.2

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Note: you may see a question or two about **real zeros** of a function.

Real zeros are the same as real roots. When we look at a graph of a function, real zeros/roots correspond to x-intercepts.

#1 Points possible: 2. Total attempts: 3

The two real zeros for the function $f(x) = x^6 - 29x^4 - 27x^2 - 90$ take the exact form $x = \pm \sqrt{N}$, where N is an integer.

Use Mathematica to find the value of N :

$N =$ 30

#2 Points possible: 2. Total attempts: 3

The equation $x^4 - 3x^3 = \cos(3x) + 10$ has two real solutions on the interval from -10 to 10. Lets call these two solutions $x = r$ and $x = s$. Use Mathematica's FindRoot command to find r . Then repeat to find s .

Now let M equal the sum of these two solutions (i.e. $M = r + s$). Enter the value for M in the space provided below.

$M =$ 1.96924 Use at least 4 decimal places in your answer.

#3 Points possible: 2. Total attempts: 3

The intersection point of the lines $y = 2x - 4$ and $y = x + 6$ is (10,16). To graph the two lines and the point we could start by entering and evaluating the following.

$a = \text{ListPlot}[\{\{10,16\}\}]$

$b = \text{Plot}[\{2x-4, x+6\}, \{x, -20, 20\}]$

What command should we enter next to display the lines and intersection point together?

- ☒ $\text{Show}[\{a,b\}]$
- ☐ $\text{Display}[\{a,b\}]$
- ☐ $\text{Display}[a+b]$
- ☐ $\text{Plot}[\{a,b\}]$
- ☐ $\text{Show}(a,b)$
- ☐ $\text{Display}(a,b)$

#4 Points possible: 2. Total attempts: 3

Which Mathematica command will produce ALL of the roots of the equation below in just one step?

$$x^5 - 8x^4 - 2x^3 + 156x^2 - 399x + 253 = 0$$

- ☐ FindRoot
 - ☐ AllSolve
 - ☒ NSolve
 - ☐ PolyAll
 - ☐ Solve
 - ☐ RootsAll
 - ☐ None of the above
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#5 Points possible: 2. Total attempts: 3

Use the appropriate Mathematica command to find all five real roots of the equation below in one step. Then enter the largest root.

$$x^5 - 8x^4 - 12x^3 + 236x^2 - 589x + 372 = 0$$

The largest root = 5.56776 (Include five decimal places)

#6 Points possible: 2. Total attempts: 3

Suppose that $f(x) = \frac{x+6}{x-3}$ and $g(x) = \frac{2x-1}{x-17}$.

Find the exact value of the x -intercept of the function $f(g(x))$.

Enter your answer as a reduced fraction or as an integer. No decimals!

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#7 Points possible: 2. Total attempts: 3

Use *Mathematica* to determine the number of intersection points for the following two functions.

$$f(x) = -4 + 0.1x^2 \text{ and } g(x) = e^{-0.01x^2} \sin(2x)$$

Hint: You can try finding the intersection points by solving an equation on *Mathematica*, but you may need to resort to a purely graphical method.

- ☐ 0
 - ☐ 1
 - ☒ 2
 - ☐ 3
 - ☐ 4
 - ☐ more than 4
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