

Assignment 2: Graphing Functions (0.2)
Please provide a handwritten response.

Name _____

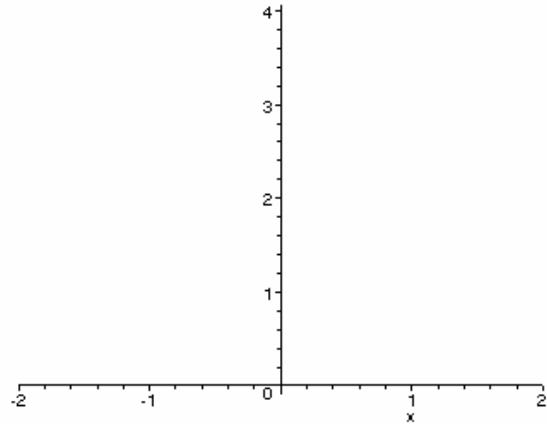
1a. In *Maple*, functions $y = f(x)$ are graphed using the `plot` command. For example, execute the command

```
f:=x->x^2;
```

to define the familiar function $f(x) = x^2$ and then graph this function over the domain $-2 \leq x \leq 2$ by executing the command

```
plot(f(x), x=-2..2);
```

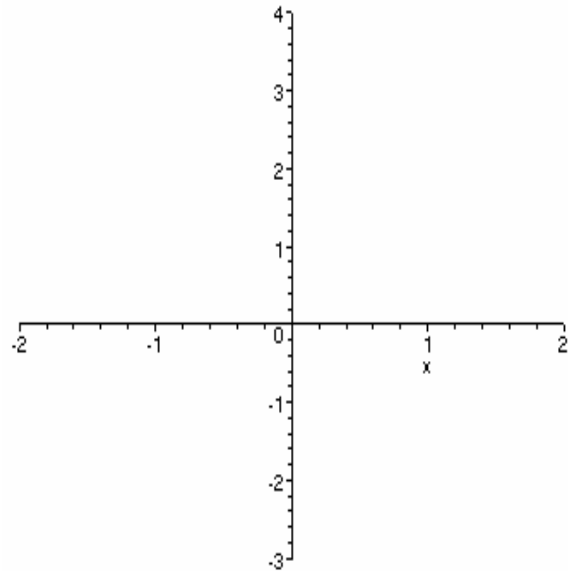
Sketch the result on the axes at right.



1b. *Maple* automatically chose an appropriate y -range for the graph in Question 1. However, we can specify a different y -range by specifying the plot range in the plot command. Execute the command

```
plot(f(x), x=-2..2, -3..4);
```

to graph f over the same domain as in part **a** but with y -range $-3 \leq y \leq 4$, and sketch the result on the axes at right.



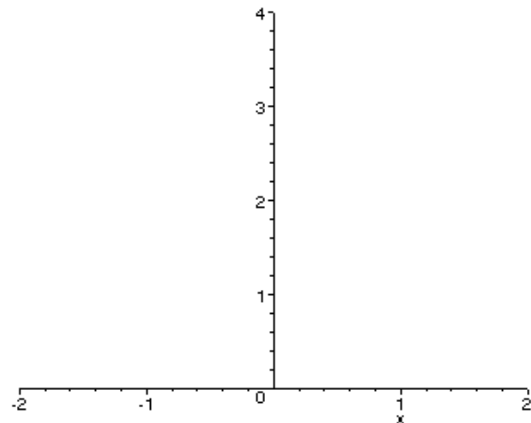
1c. The `plot` command can also be used to graph two or more functions together. Execute the command

```
g:=x->4-x^2;
```

to define the function $g(x) = 4 - x^2$, and then graph f and g over the domain $-2 \leq x \leq 2$ on the same axes by executing the command

```
plot([f(x), g(x)], x=-2..2);
```

Sketch the result on the axes at right.

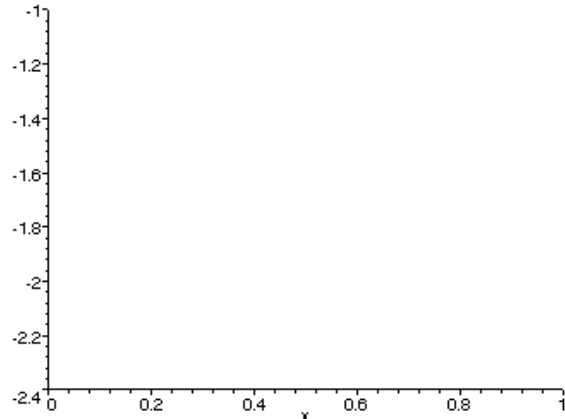


2a. We can also use the `plot` command to “zoom” in on details of graphs. Execute the command `f:=x->x^3+4*x^2-5*x-1;` to define the function $f(x) = x^3 + 4x^2 - 5x - 1$ in *Maple*, and then execute the command `plot(f(x), x=-4..4);`. (Note: We do not need to use the `unassign` command. *Maple* automatically reassigns $f(x)$.)

2b. The graph seems to have a local minimum between $x = 0$ and $x = 1$; we can use zooming to locate this minimum as accurately as we wish. Start by executing the command

`plot(f(x), x=0..1);`

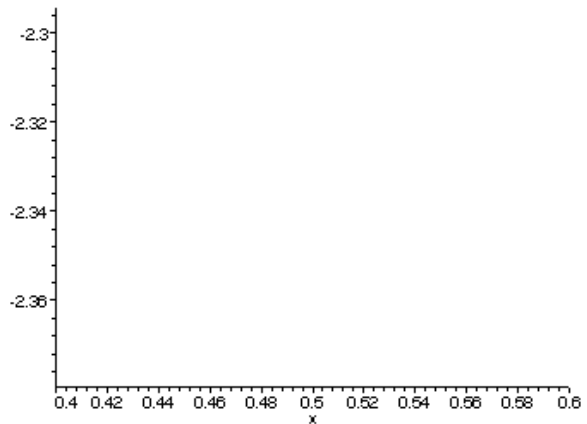
to get a closer look, and sketch the result on the axes at right.



2c. We can see now that the minimum actually lies between $x = 0.4$ and $x = 0.6$; zoom in still further by executing the command

`plot(f(x), x=0.4..0.6);`

and sketch the result on the axes at right. What can we now say about the location of the minimum?

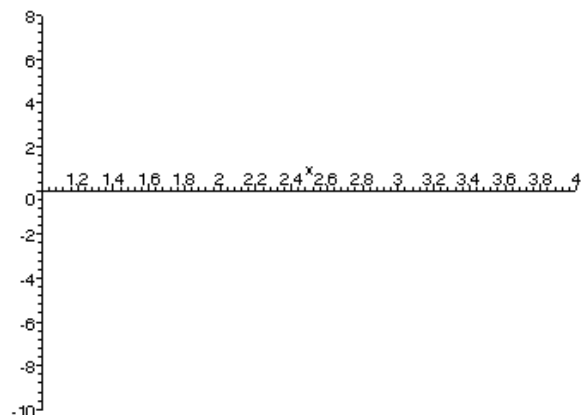


3. Execute the command

`f:=x->(x-1)/(x^2-5*x+6);`

to define the function $f(x) = \frac{x-1}{x^2-5x+6}$.

Now use the `plot` command with the range option as you did above to graph f over the domain $1 \leq x \leq 4$ with y -range $-10 \leq y \leq 8$, and sketch the result on the axes at right. Do the coordinate axes cross at the origin? Why does the graph include two vertical lines?



Use the command `plot(f(x), x=1..4, -10..8, discont=true);` to remove the vertical lines.