

Variations in the Graph of a Function

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Objective

To illustrate the variations in the graph of a function that result from variations in the way the function is specified.

Narrative

In this project, we investigate the variations in the graph of a function f that result from varying the definition of f .

Tasks

1. Type the command lines below into Maple in the order in which they are listed. They produce a graph of $f(x) = x^3 - x$.

```
> # Your name, today's date
> # Variations in the Graph of a Function
> # Task 1
> restart;                               Clear Maple's memory.
> f := x -> x^3-x;                       Let  $f(x) = x^3 - x$ .
> plot(f(x),x=-4..4,y=-6..6);           Graph  $f$  over the interval  $[-4, 4]$ .
```

2. Continue by typing the following lines into Maple.

```
> # Task 2
> plot({f(x),f(x+2),f(x-2),f(x)+2,f(x)-2},x=-4..4,y=-6..6);
> plot({f(x),f(2*x),f(x/2),2*f(x),f(x)/2},x=-4..4,y=-6..6);
> plot({f(x),f(-2*x),f(-x/2),-2*f(x),-f(x)/2},x=-4..4,y=-6..6);
```

At this point, make a hard-copy of your typed input and Maple's responses. Then:

3. Label the curves in each of the plots you produced in Task 2. For example, label the graph of f in each plot by " $y = f(x)$ ". (If your hard-copy will not be in color, it might be useful to refer to the color output on your computer monitor when doing this labeling.)

Your lab report will be a hard copy of your typed input and Maple's responses (both text and hand-labeled graphics).