

# Graphing Functions Again

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## Objective

To get more exercise graphing a function  $f$  using its first and second derivatives.

## Narrative

In this project we provide another example that involves graphing a function  $f$  using its first and second derivatives.

## Task

1. Type the command lines below into Maple in the order in which they are listed. They produce some information about the function  $f(x) = (1 - x^2)/(1 + x^2)$ .

```
> # Your name, today's date
> # Graphing Functions Again
> restart:
> with(plots):
> # Task 1
> Digits := 5;
> f := x -> (x+1)^2*(x-1)^3*(x-2);
> fsolve(f(x)=0,x);
> f1 := D(f);
> fsolve(f1(x)=0,x);
> f2 := D(f1);
> fsolve(f2(x)=0,x);
```

2. Continue by typing the following command lines into Maple. They draw an empty graph and three recording strips.

```
> # Task 2
> with(plots):
> plot0 := plot({-6,-5,-4,-3,0},x=-6..6,y=-6..3,color=black):
> plot1 := textplot({[-6,-3.5,'f'],[-6,-4.5,'f1'],[-6,-5.5,'f2']});
> display({plot0,plot1});
```

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

3. Fill in the recording strips on the graphic you produced using information about  $f$ ,  $f'$  and  $f''$ .
4. Use the information in the recording strips to sketch the graph of  $f$ .

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