

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 $f(x) = x^3/(x^4 + 1)$.

```
> # Your name, today's date
> # Graphing Functions Again
> restart:
> with(plots):
> # Task 1
> Digits := 5;
> f := x -> x^3/(x^4+1);
> fexp := simplify(f(x));
> fsolve( numer(fexp)=0,x);
> fsolve( denom(fexp)=0,x);
> f1 := D(f);
> f1exp := simplify(f1(x));
> fsolve( numer(f1exp)=0,x);
> fsolve( denom(f1exp)=0,x);
> f2 := D(f1);
> f2exp := simplify(f2(x));
> fsolve( numer(f2exp)=0,x);
> fsolve( denom(f2exp)=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).