

## Maple worksheet 2

To find the equation of a line tangent to the graph of a function  $f$  at a point  $(a, f(a))$ , we need the slope, and then can use the point-slope formula to find the equation. Here is an example where the equation for the tangent line is found and then graphed along with the function. The slope is found using the definition for the slope of a tangent line on page 148 of the textbook.

```
> f:=x->x^3;
```

$$f := x \rightarrow x^3$$

```
> f(2);
```

8

```
> m:=limit((f(2+h)-f(2))/h,h=0);
```

$m := 12$

```
> y:=m*(x-2)+8;
```

$$y := 12x - 16$$

```
> plot({f(x),y},x=-10..10,-10..10):
```

Here I have used a colon instead of a semi-colon to suppress the output. You should use a semi-colon and get a nice picture. Let's zoom in a little. Notice how this is done.

```
> plot({f(x),y},x=-2..4,0..20):
```

Try this same exercise with the square root function at  $(4,2)$ . The square root function is written in maple as  $\text{sqrt}(x)$ .

Try again with the reciprocal function at  $(2,5)$  and the logarithm function at  $(1,0)$ . The logarithm in maple is written as  $\text{log}(x)$ . These should be straight forward.

What is more interesting is the exponential function  $e^x$ , which you write as  $\text{exp}(x)$ . Try this exercise at  $(0,1)$ ,  $(1,e)$  and  $(2,e)$ . For what values of  $x$  is  $\text{exp}(x) > 1+x$ ? Where do the lines cross the  $x$ -axis?

Now that you have some experience with maple, try some otherwise annoying homework problems. Specifically, page 111, numbers 45, 47, 48 and 49. The greatest integer function is written in maple as  $\text{floor}(x)$ . The absolute value function is written as  $\text{abs}(x)$ .