

Maple Assignment 2 – Derivatives in Maple

Math 226 - Calculus I - Fall 2006

Due Wednesday, October 4 by the beginning of class

Examples:

- 1) Use Maple to find the derivative of $f(x) = x^3 - 4x^2 - 1$ (a) by the definition and (b) through the Maple differentiation command.

(a)

```
> f := x -> x^3 - 4x^2 - 1;  
> limit((f(x+h)-f(x))/h, h=0);
```

(b)

```
> f := x -> x^3-4x^2-1;  
> D(f)                /* f' as a Maple function */  
> diff(f(x), x)      /* f' as a Maple expression */
```

- 2) Find the slope of the tangent line to the graph of the function $\cos(x^2)$ at $x = 1$.

```
> f := x -> cos(x^2);  
> D(f)(1)
```

Exercises

1. Use the definition of derivative (and Maple's limit command) to calculate the derivative of each function.

(a) $g(t) = \frac{t^2-t+1}{t+5}$

(b) $f(x) = \sin(\pi x)$

(c) $m(x) = \sqrt{1-x-x^2}$

(d) $p(x) = \arctan x$

2. Let $f(x) = 3\ln(x^2 + 2)$
- (a) Use Maple to find an equation of the tangent line to $f(x)$ at $x = 2$.
 - (b) Declare the function l whose graph is the tangent line in part (a).
 - (c) Use the function l as a way to approximate $f(2.3)$.
 - (d) Use the plot command to illustrate, on a single graph, the graph of the function together with this tangent line.
3. Let $f(x) = 4x^3 + 3x^2 - 2x + 1$.
- (a) Use Maple to determine $f'(x)$.
 - (b) Find where $f'(x) = 0$.
 - (c) Using your answer from (b) and a graph of $f'(x)$, determine where f is increasing and where f is decreasing. (*Hint:* This is where $f' > 0$ and $f' < 0$ respectively.)