MA1E01: Tutorial week 6

REMEMBER TO HAND PROBLEMS BEFORE THE TUTORIAL STARTS

- Derivatives

Problem 1 *Compute the derivative of the following function and explain how you did the computation*

$$f(x) = \sqrt{3x^4 + 12x^2 + 1}$$

Problem 2 *Compute, using the limit definition, the derivative of*

$$f(x) = \frac{x^2 + 1}{3}$$

at $x = 1$.

Then compute the derivative function $f'(x)$ *using the rules for derivation, and check that the previous result is correct.*

Problem 3 *Compute the derivative of the following function and explain how you did the computation*

$$f(x) = \frac{\sin(3x^4 + 12x^2 + 1)}{x^2 + 1}$$

Problem 4 *Complete:*

- $\frac{\mathrm{d}}{\mathrm{d}x}\sqrt{\sin x} =$
- $\frac{\mathrm{d}}{\mathrm{d}x}\sqrt{x^3 + 2x} =$
- $\frac{\mathrm{d}}{\mathrm{d}x}\sqrt{f(x)} =$
- $\frac{\mathrm{d}}{\mathrm{d}x}\sqrt{y(x)} =$

Problem 5 *Determine* $\frac{\mathrm{d}y}{\mathrm{d}x}$ *as a function of* x *and* y *for the following cases*

- $\sqrt{y} + y = 3$
- $\sqrt{y} + y = 3x$
- $\sqrt{y} + \sin y = 3x^4$

Problem 6 *Determine* $\frac{\mathrm{d}y}{\mathrm{d}x}$ *as a function of* x *and* y *in the case that*

$$\sqrt{\sin(\cos y)} + x^2 \cos y = y$$