

Tag : Toetsen/MathB1.17-18[01].EN
 Course : **Mathematics B1**
 Date : Friday October 27th, 2017
 Time : 13:45 – 15:45

Motivate all your answers.
The use of electronic devices is not allowed.

1. Define $P(-1, 1, 1)$, $Q(1, 3, 0)$, and $R(-2, 1, 2)$.
- (a) [1 pt] Calculate $\overrightarrow{PQ} \times \overrightarrow{PR}$.
- (b) [2 pt] Find an equation for the plane that contains the points P , Q and R .
- (c) [2 pt] In the triangle PQR , calculate the angle at vertex P .

2. [3 pt] Calculate

$$\lim_{x \rightarrow 1} \frac{x - 1}{x - \sqrt{x}}.$$

3. Define

$$f(x) = \begin{cases} \tan^{-1}\left(\frac{1}{x}\right) & \text{if } x \neq 0, \\ -\frac{\pi}{2} & \text{if } x = 0. \end{cases}$$

- (a) [2 pt] Show that $\lim_{x \rightarrow 0^-} f(x) = f(0)$.
- (b) [2 pt] Is f continuous at 0? Motivate your answer.
4. [4 pt] Find the absolute extreme values of the function

$$f(x) = x - 2\sqrt{x}$$

on the interval $[0, 9]$.

5. [3 pt] Calculate

$$\lim_{(x,y) \rightarrow (0,0)} \frac{x\sqrt{|y|}}{\sqrt{x^2 + y^2}},$$

or show that this limit does not exist.

6. [3 pt] Find an equation for the tangent plane to the graph of the function

$$f(x, y) = x^3 + x^2y - y^2$$

at the point $(1, -1, -1)$.

Simplify the equation as much as possible.

Total: 22 points