Analysis test

Exercise 1

Determine the logical relation between these two statements:

1. **P:** The function f is strictly monotonically increasing.
2. **Q:** The function f converges to infinity.

Exercise 2

a) Determine the limit of the following

$$\lim_{n\to\infty}\left(1+\frac{n}{n^2}\right)^{2n}$$

b) Determine the limit of the following

$$\lim_{x\to\infty}\frac{4x^2+9x-3}{5x^2+4x-13}$$

Exercise 3

a) Determine the limit of the following

$$\lim_{n\to\infty}\frac{4^n+2}{6^n}$$

b) Determine if the following limit is convergent

$$\lim_{n\to\infty}\frac{n^2+3^n}{n!}$$

Exercise 4

a) Determine the following limit

$$\lim_{x\to 0^+}\frac{x^{-3}+5x^{-2}}{2x^{-2}+x^{-1}}$$

b) Determine the following limit

$$\lim_{h\to 0}\frac{(x+h)^3-x^3}{h}$$

Exercise 5

Determine at which point is the tangent of the following function horizontal

$$f(x)=3x^3-2x^2+5$$