

20 October 2010

1. (6p)	2. (5p)	3. (5p)	4.(5p)	5. (10p)	6. (5p)	Th. (4p)	Σ (Max 40p)

Corrected by:

1. a.) Find $N(\varepsilon)$ for the sequence $a_n = \frac{3\sqrt{n}}{1-\sqrt{n}}$ if $\varepsilon=0,02$.

b.) Find the following limit: $\lim_{n \rightarrow \infty} \left(\frac{n^2 + 2}{n^2 + 3} \right)^{2n^2}$!

2. Find the points of discontinuity for the following function, and classify them:

$$f(x) = \begin{cases} \frac{6}{2-x^3} & \text{if } x \leq 0 \\ \frac{\sin(3x)}{x} & \text{if } 0 < x \leq 3\pi \\ \frac{1}{x-3\pi} & \text{if } x > 3\pi \end{cases}$$

3. Find the derivative of the following functions

a.) by definition: $f(x) = 2 + \sqrt{x}$

b.) by rules: $g(x) = (x + \cos x) \cdot \left(\frac{1}{x} + \ln x \right)$

4. Find the following limit by L'Hospital rule: $\lim_{x \rightarrow 8} \frac{2 - \sqrt[3]{x}}{x^2 - 64}$

5. Sketch the graph of the function $f(x) = (2x-1) \cdot e^{2x}$

6. a.) Evaluate $\underline{a} \cdot \underline{b}$ and $\cos \phi$ if $\underline{a} = 3\underline{i} + 2\underline{j} + 5\underline{k}$ and $\underline{b} = \underline{i} + 2\underline{j} + 2\underline{k}$

b.) Find x if $\begin{vmatrix} 1 & 3 & 0 \\ x & 2x & 1 \\ 1 & 0 & 3 \end{vmatrix} = 18$

Theoretical question:

Prove that $\cosh^2 x - \sinh^2 x = 1$!