IX Exercise Lesson

Monday, December 1st 2014

Ex. 1   1. Study the function $f(x) = \frac{e^x}{x+1}$. Find domain, sign, axis intercepts; vertical and horizontal asymptotes; maximum and minimum points. Draw the graph.

2. Calculate the order of the function $xe^{x^2} - x$ at $x = 0$

3. Calculate absolute maximum and minimum of the function $f(x) = \ln(2x - 1)$ in the interval $[1, 3]$.

4. Given

$$f(x) = \begin{cases} \dfrac{a\sin(x-1)}{x-1} & \text{for } x < 1 \\ \ln(2x^2 - 1) + 1 & \text{for } x \geq 1 \end{cases}$$

find a that makes f continuous on $\mathbb{R}$

Ex. 2   1. Study the function $f(x) = xe^{\frac{1}{x}}$. Find domain, sign, axis intercepts; vertical and horizontal asymptotes; maximum and minimum points. Draw the graph.

2. Find the Taylor polynomial of order 4 of the function e^{x^2+1} at $x = 1$.

3. Find accumulation points and isolated points of the set $\left\{ \frac{(-1)^n + 2}{2} | n \in \mathbb{N} \right\}$.

4. Consider the function $f(x) = 1 - e^{-x} + e^{2x}$. Does there exist any point $x_0 \in [0, +\infty)$ such that $f(x_0) = 0$?