Math 317 Winter 2017 Homework 4 Solutions

DUE THURSDAY MAR. 23, 2017 5PM

- The total points of this homework is 20.

- You need to fully justify your answer – for example, prove that your function indeed has the specified property – for each problem.

QUESTION 1. (8 PTS) *Let $f(x)$ be defined through*

$$\sum_{n=1}^{\infty} \frac{n-1}{n+1} \left(\frac{x}{3\,x+1} \right)^n. \tag{1}$$

a) (4 PTS) *Find the domain A of $f(x)$, that is find all $x \in \mathbb{R}$ such that the series converges.*

b) (4 PTS) *Is the convergence uniform on A? Justify your claim.*

QUESTION 2. (8 PTS) *Consider the function defined through*

$$f(x) := \sum_{n=1}^{\infty} \frac{\sin(n\,x)}{n^2}. \tag{2}$$

a) (4 PTS) *Find the domain A of $f(x)$;*

b) (4 PTS) *Prove or disprove: $f(x)$ is continuous on A.*

QUESTION 3. (4 PTS) *Let $f_n(x)$ be continuous on $[a,b]$ and assume $f_n \longrightarrow f$ uniformly on (a,b). Prove that f_n converges uniformly on $[a,b]$.*