Math 120A
August 22, 2022

Question 1 The functions $f_k : [0,1] \to \mathbb{R}$ given by $f_k(x) = x^k$

A. are all continuous.

B. converge pointwise to a discontinuous function.

C. converge uniformly to a discontinuous function.

*D. **A** and **B**.

E. all of the above; if they converge uniformly, they also converge pointwise.

Question 2 Given a power series $f(z) = \sum_{k=0}^{\infty} a_k (z - z_0)^k$ with radius of convergence $R = +\infty$. We can conclude

A. $f(z)$ converges for all $z \in \mathbb{C}$.

B. $f(z)$ converges for all z with $|z - z_0| < R$.

C. $f(z)$ converges for all z with $|z| < R$.

*D. all of the above since every positive real number is less than $+\infty$.

E. none of the above since $+\infty$ is not a positive real number and cannot be a radius of convergence.

Question 3 Suppose $\sum_{k=0}^{\infty} a_k z_0^k$ converges. We conclude that $\sum_{k=0}^{\infty} a_k z^k$

A. converges absolutely for every z with $|z| < |z_0|$.

B. converges uniformly for every z with $|z| \leq r$ whenever $r < |z_0|$.

C. converges absolutely for every z with $|z| = |z_0|$.

*D. **A** and **B**.

E. all of the above.

Question 4 Given a power series $f(z) = \sum_{k=0}^{\infty} a_k (z - z_0)^k$ with radius of convergence $R = 0$. We can conclude

A. $f(z)$ converges only when $z = z_0$.

B. $f(z)$ converges for all z with $|z - z_0| \leq R$.

C. $f(z)$ converges for all z with $|z - z_0| < R$.

*D. **A** and **B**; they are the same.

E. none of the above since a radius must be positive.