Math 120A
August 26, 2019

Question 1 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 real number and cannot be a radius of convergence.

Question 2 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 3 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.

Question 4 The functions $f_k : [0,1] \to \mathbb{R}$ given by $f_k(x) = x^k$

A. are all continous.

B. converge pointwise to a discontinuous function.

C. converge uniformly to a discontinous function.

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

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

Question 5 A set $D \subset \mathbb{C}$ is a *domain* if

A. for every $z \in D$ there is $\epsilon > 0$ so that $\{w \in \mathbb{C} \mid |w - z| < \epsilon\} \subset D$.

B. any two points in D can be connected by a continuous path consisting of a finite number of line segments.

C. for every pair of points $z_1, z_2 \in D$, the line segment joining them is contained in D.

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

E. all of the above.