Quiz 11

Spring 2016

MATH 222-004

Name: _____

For full credit please explain all of your answers. **No calculators** are allowed.

Problem 1. Determine the interval of convergence for the following power series, remember to check endpoints.

$$\sum_{n=1}^{\infty} \frac{nx^n}{5^{n-1}}$$

Solution 1.

We apply the ratio test

$$\lim_{n\to\infty} \left| \frac{(n+1)x^{n+1}5^{n-1}}{nx^n 5^n} \right| = \frac{|x|}{5}$$

We have convergence when $|x| < 5$. Checking endpoints when we plug in 5 we have divergence. When we plug in -5 we still have divergence by the divergence test. Hence the radius of convergence is 5 and the interval of convergence is $|x| < 5$. □

Problem 2. Do there exist real numbers x and y such that

$$x\begin{pmatrix}1\\2\end{pmatrix} + y\begin{pmatrix}1\\1\end{pmatrix} = \begin{pmatrix}2\\1\end{pmatrix}$$

Where $\binom{1}{2}, \binom{1}{1}, \binom{2}{1}$ are vectors. Defend your answer. If no, why? If yes, you can explain why or find a solution.

Solution 2.

Yes. Take $x = -1$, $y = 3$. You could also argue that these vectors are linearly independent because they are vectors in $\mathbb{R}^2$ and they aren't colinear, i.e. they are not multiples of each other. How would you find x and y? □