Quiz 10

Spring 2016

MATH 222-004

Name: _____

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

Problem 1. Determine whether the following series converges or diverges:

$$\sum_{n=1}^{\infty} \frac{3 + 2^{-n}}{\sqrt{n}}$$

If you use a convergence test clearly state which one you use and show all work.

Solution 1.

If we compare to $\frac{1}{\sqrt{n}}$ because $3 + 2^{-n} > 1$ we have

$$\frac{3 + 2^{-n}}{\sqrt{n}} > \frac{1}{\sqrt{n}}$$

We know $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$ diverges so by comparison $\sum_{n=1}^{\infty} \frac{3+2^{-n}}{\sqrt{n}}$ diverges. □

Problem 2. Determine whether the following series converges or diverges:

$$\sum_{k=1}^{\infty} \frac{5^k}{3^k + 4^k}$$

If you use a convergence test clearly state which one you use and show all work.

Solution 2.

We first try to divergence test

$$\lim_{k\to\infty} \frac{5^k}{3^k + 4^k} = \lim_{k\to\infty} \frac{4^k}{4^k} \frac{(5/4)^k}{(3/4)^k + 1} = \infty$$

So the series diverges. □