Quiz 3, Math 1023 Name: _____ Conference: Mon. Fr.

Show **all steps** to earn credits.

state the test

1. (6 points) Determine the convergence or divergence of the series. **Give reasons for your answer.**

1) $\sum_{n=1}^{\infty} \frac{n}{n+1}$ 2) $\sum_{n=1}^{\infty} \frac{4}{\sqrt{n}}$

Sol 1) $\lim_{n\to\infty} \frac{n}{n+1} = \lim_{n\to\infty} \frac{1}{1+\frac{1}{n}} = 1 \neq 0$ 1pt

By test for divergence, $\sum a_n$ diverges. 1pt 1pt

2) $p = \frac{1}{2} \leq 1$, by p-series test, $\sum a_n$ diverges. 1pt 1pt 1pt

2. (4 points) Determine the convergence or divergence of the series. **Give reasons for your answer.**

~~1) $\sum_{n=1}^{\infty} \frac{n+1}{n^3+1}$~~ 2) $\sum_{n=1}^{\infty} \frac{n+1}{4^n}$

state the test

Sol $a_n = \frac{n+1}{4^n}$

$$\left|\frac{a_{n+1}}{a_n}\right| = \left|\frac{n+2}{4^{n+1}} \cdot \frac{4^n}{n+1}\right| = \left|\frac{4^n}{4^{n+1}} \cdot \frac{n+2}{n+1}\right| = \frac{1}{4} \cdot \frac{n+2}{n+1}$$ 1pt

$$\lim_{n\to\infty} \left|\frac{a_{n+1}}{a_n}\right| = \lim_{n\to\infty} \frac{1}{4} \cdot \frac{n+2}{n+1} = \frac{1}{4} \lim_{n\to\infty} \frac{1+\frac{2}{n}}{1+\frac{1}{n}} = \frac{1}{4} < 1$$ 1p

By ratio test, since $L = \frac{1}{4} < 1$, $\sum a_n$ converges. 1pt 1pt