Math 172 | Quiz 11 | Name: ______________

5 Apr 2016 | Show Appropriate Work | Point Values in $\boxed{\text{boxes}}$.

1. $\boxed{2}$ Use the Alternating Series Test to show the following converges.

$$\sum \frac{(-1)^n}{\sqrt{n}}$$

i) $a_n = \frac{1}{\sqrt{n}} > 0$ ✓

ii) $a_{n+1} = \frac{1}{\sqrt{n+1}} < \frac{1}{\sqrt{n}} = a_n$ ✓

iii) $a_n = \frac{1}{\sqrt{n}} \xrightarrow[n\to\infty]{} 0$ ✓

so by the Alternating Series Test, $\sum \frac{(-1)^n}{\sqrt{n}}$ converges

2. $\boxed{2}$ Use the Ratio Test to show the following converges or diverges.

$$\sum \frac{n2^n}{(2n)!}$$

$$\left|\frac{a_{n+1}}{a_n}\right| = \left|\frac{(n+1)2^{n+1}}{(2n+2)!}\cdot\frac{(2n)!}{n\,2^n}\right| = \frac{n+1}{n}\cdot\frac{2}{1}\cdot\frac{1}{(2n+2)(2n+1)} \xrightarrow[n\to\infty]{} 0$$

so $\sum \frac{n\,2^n}{(2n)!}$ converges by the Ratio Test

3. $\boxed{2}$ Use the Root Test to show the following converges or diverges.

$$\sum \left(\frac{2n+1}{3n+4}\right)^n$$

$$\sqrt[n]{\left|\left(\frac{2n+1}{3n+4}\right)^n\right|} = \left(\frac{2n+1}{3n+4}\right) \xrightarrow[n\to\infty]{} \frac{2}{3}$$

so $\sum \left(\frac{2n+1}{3n+4}\right)^n$ converges by the Root Test

4. $\boxed{4}$ For the following series, specify the appropriate test to apply. If that test is either the Direct Comparison or the Limit Comparison, specify what series you would compare with. Do not write out the details of the test. For each, also determine if the series **Con**verges or **Div**erges.

(a) $\sum \frac{3n+1}{\sqrt{4n^5+7}}$ **Con** / **Div**

LCT, $\sum \frac{n}{n^{5/2}} = \sum \frac{1}{n^{3/2}}$

(c) $\sum \frac{(-1)^n}{\sqrt{n^2+1}}$ **Con** / **Div**

A.S.T.

(b) $\sum \frac{1}{n^3+7}$ **Con** / **Div**

D.C. $\sum \frac{1}{n^3}$

(d) $\sum \frac{1}{n(\ln n)^2}$ **Con** / **Div**

Integral Test