Math 172 | Quiz 9 | Name: ______________
2 Nov 2016 | Show Appropriate Work | Point Values in $\boxed{\text{boxes}}$.

1. $\boxed{4}$ Complete the following statements.

   (a) GEOMETRIC SERIES.

   - For $c \neq 0$, the geometric series $\sum_{n=0}^{\infty} cr^n$ converges to $\frac{c}{1-r}$ for $|r| < 1$, and diverges for $|r| \geq 1$.

   (b) TEST FOR DIVERGENCE.

   - If $a_n \not\to 0$ as $n \to \infty$, then $\sum a_n$ diverges.

   (c) P-SERIES.

   - $\sum_{n=1}^{\infty} \frac{1}{n^p}$ converges for p > 1, and diverges for p ≤ 1.

   (d) INTEGRAL TEST.

   - If $a_n = f(n)$ and $f(x)$ is positive, continuous & decreasing, then the Integral Test applies.

2. $\boxed{2}$ For the following series, specify what series you would compare each to and based on your comparison, decide if it converges or diverges. No formal justification is needed.

   (a) $\sum_{n=2}^{\infty} \frac{\sqrt[3]{1+n^7}}{n^3+4n}$ compare to $\sum \frac{n^{7/3}}{n^3} = \sum \frac{1}{n^{2/3}}$ so it CONVERGES / DIVERGES

   (b) $\sum_{n=2}^{\infty} \frac{4+2n}{n^2+4n+1}$ compare to $\sum \frac{1}{n}$ so it CONVERGES / DIVERGES

3. $\boxed{4}$ Use the Limit Comparison Test to show the following converges.

$$\sum \frac{2n^2+4}{\sqrt{5n^8+4n^2}}$$

Since $\sum \frac{2n^2+4}{\sqrt{5n^8+4n^2}}$ & $\sum \frac{1}{n^2}$ are ~~bo~~ both positive we can apply the L.C.T.

We compute $\lim_{n\to\infty} \frac{2n^2+4}{\sqrt{5n^8+4n^2}} \Big/ \frac{1}{n^2} = \frac{2}{\sqrt{5}}$. Since $0 < \frac{2}{\sqrt{5}} < \infty$ & $\sum \frac{1}{n^2}$ is a convergent p-series $(p = 2 > 1)$, by the Limit Comparison Test,

$\sum \frac{2n^2+4}{\sqrt{5n^8+4n^2}}$ also converges.