Math 172 | Quiz 8 | Name: ________________

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

1. $\boxed{1}$ Find the sum.

$$4 - \frac{8}{5} + \frac{16}{25} - \frac{32}{125} + \frac{64}{625} - \cdots = \frac{4}{1-(-2/5)} = \frac{20}{7}$$

2. $\boxed{4}$ For the following determine if the conclusion is a **V**alid use of the Comparison Test or an **I**nvalid use.

   (a) **V** / **I** : Since $0 < \frac{1}{n} < \frac{1}{n-1}$ and $\sum \frac{1}{n}$ diverges, by comparison $\sum \frac{1}{n-1}$ also diverges.

   (b) **V** / **I** : Since $0 < \frac{1}{n+1} < \frac{1}{n}$ and $\sum \frac{1}{n}$ diverges, by comparison $\sum \frac{1}{n+1}$ also diverges.

   (c) **V** / **I** : Since $0 < \frac{1}{n^2} < \frac{1}{n^2-1}$ and $\sum \frac{1}{n^2}$ converges, by comparison $\sum \frac{1}{n^2-1}$ also converges.

   (d) **V** / **I** : Since $0 < \frac{1}{n^2+1} < \frac{1}{n^2}$ and $\sum \frac{1}{n^2}$ converges, by comparison $\sum \frac{1}{n^2+1}$ also converges.

3. $\boxed{1}$ Assume $a_n, b_n > 0$ and $\lim_{n\to\infty} \frac{a_n}{b_n} = 0$, are the following **T**rue or **F**alse.

   (a) **T** / **F** : If $\sum b_n$ converges, then $\sum a_n$ converges.

   (b) **T** / **F** : If $\sum b_n$ diverges, then $\sum a_n$ diverges.

4. $\boxed{4}$ Show $\sum \frac{n-1}{\sqrt{n^5+3}}$ converges.

Since $0 < \frac{n-1}{\sqrt{n^5+3}} < \frac{n}{n^{5/2}} = \frac{1}{n^{3/2}}$

and $\sum \frac{1}{n^{3/2}}$ is a convergent p-series $(p = 3/2 > 1)$,

by comparison, $\sum \frac{n-1}{\sqrt{n^5+3}}$ also converges.