1. $\boxed{1}$ Fill in the blanks.

For $c \neq 0$, $\sum_{n=0}^{\infty} cr^n$ converges to $\underline{\quad \frac{c}{1-r} \quad}$ if $\underline{\quad |r| < 1 \quad}$ and diverges if $\underline{\quad |r| \geq 1 \quad}$.

2. $\boxed{3}$ Please indicate True or False.

(a) T /**F**: If $a_n \to 0$ as $n \to \infty$, the series $\sum a_n$ converges.

(b) T / **F** : If $a_n \to 0$ as $n \to \infty$, the series $\sum a_n$ diverges.

(c) T / **F** : If $a_n \to 0$ as $n \to \infty$, the series $\sum a_n$ neither converges nor diverges.

(d) **T** / F : If $a_n \to 2$ as $n \to \infty$, the series $\sum a_n$ diverges.

(e) T / **F** : The geometric series

$$1 + \frac{5}{2} + \frac{25}{4} + \frac{125}{8} + \frac{625}{16} + \cdots$$

converges to $\dfrac{1}{1 - \frac{5}{2}}$.

(f) **T** / F : The geometric series

$$1 - \frac{2}{5} + \frac{4}{25} - \frac{8}{125} + \frac{16}{625} - \cdots$$

converges to $\dfrac{1}{1 + \frac{2}{5}}$.

3. $\boxed{2}$ For each of the following series, determine if it is a Convergent geometric series, a Divergent geometric series, or Not a geometric series.

(a) C / D / **N** : $\sum \left(\frac{3}{n}\right)^n$

(b) **C** / D / N : $\sum 4^{-n}$

(c) **C** / D / N : $\sum \frac{-7}{3^n}$

(d) C / **D** / N : $\sum \frac{3^{2n}}{(-7)^n}$

4. $\boxed{2}$ We discussed the Integral Test in class on Tuesday. In order to apply that test we need a function $f(x)$ with the following properties. (Choose all that are required. Assume each statement is true for all $x > N$.)

(a) $f(x) > 0$ (c) $f'(x) > 0$ (e) $f(x)$ is continuous

(b) $f(x) < 0$ (d) $f'(x) < 0$ (f) $f(x)$ is differentiable

5. $\boxed{2}$ For each statement, determine if the use of the Comparison Test is Valid or Invalid.

(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 $0 < \frac{1}{n+3} < \frac{1}{n}$ and $\sum \frac{1}{n}$ diverges, by comparison $\sum \frac{1}{n+3}$ also diverges.