9. [12 points] For the following questions, determine if the statement is ALWAYS true, SOMETIMES true, or NEVER true, and circle the corresponding answer. Justification is not required.

a. [2 points] If the series \( \sum_{n=1}^{\infty} (-1)^n a_n \) diverges, then the series \( \sum_{n=1}^{\infty} a_n \) also diverges.

Circle one:  ALWAYS SOMETIMES NEVER

b. [2 points] If \( b_n \) is a sequence of positive numbers which satisfy \( \lim_{n \to \infty} \frac{1}{n^3 b_n} = 12 \), then \( \sum_{n=1}^{\infty} b_n \) converges.

Circle one:  ALWAYS SOMETIMES NEVER

c. [2 points] If \( f(x) \) is a continuous function so that \( \int_{0}^{\infty} f(x) \, dx \) converges, then \( \int_{10}^{\infty} \left( f(x) + \frac{1}{x^5} \right) \, dx \) converges too.

Circle one:  ALWAYS SOMETIMES NEVER

d. [2 points] If \( \sum_{n=0}^{\infty} d_n = \frac{1}{1 - 0.3} \), then \( d_n = (0.3)^n \) for all \( n \geq 0 \).

Circle one:  ALWAYS SOMETIMES NEVER

e. [2 points] The function given by

\[
g(x) = \begin{cases} 
  x^3, & -1 \leq x \leq \sqrt{5}, \\
  0, & \text{otherwise},
\end{cases}
\]

is a probability density function.

Circle one:  ALWAYS SOMETIMES NEVER

f. [2 points] If \( s_n \) is a decreasing sequence of positive numbers which converges, then \( \sum_{n=1}^{\infty} s_n \) converges too.

Circle one:  ALWAYS SOMETIMES NEVER