

Print your name: _____

Answer each question completely. You must justify your answers to get credit. Even a correct answer with no justification will get no credits. Each question is worth 5 points.

1. Consider the series $\sum_{n=0}^{\infty} \frac{3 \cdot 2^n}{3^n}$. Does it converge or diverge? If it converges, find the sum and if it diverges, explain why.

Solution. The series can be written as $\sum_{n=0}^{\infty} 3 \left(\frac{2}{3}\right)^n$, where $a = 3$ and $r = \frac{2}{3}$. Since $r < 1$, it means that it converges. The sum is equal to

$$\sum_{n=0}^{\infty} 3 \left(\frac{2}{3}\right)^n = \frac{3}{1 - \frac{2}{3}} = \frac{3}{\frac{1}{3}} = 9.$$

□

2. Consider the series $\sum_{n=1}^{\infty} \ln n$. Does it converge or diverge? If it converges, find the sum and if it diverges, explain why.

Solution. Since $\lim_{n \rightarrow \infty} \ln n = \infty \neq 0$, the divergence test gives that $\sum_{n=1}^{\infty} \ln n$ diverges.

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