

Each question is worth 5 points. Show good justification for full credit. Don't panic.

1. Find, correct to at least 4 decimal places, the first three partial sums of the series

$$\sum_{n=1}^{\infty} \frac{1}{n^3}$$

$$S_1 = \frac{1}{1^3} = 1$$

$$S_2 = \frac{1}{1^3} + \frac{1}{2^3} = 1 + \frac{1}{8} = \frac{9}{8} = 1.125$$

Great

$$S_3 = \frac{1}{1^3} + \frac{1}{2^3} + \frac{1}{3^3} = 1 + \frac{1}{8} + \frac{1}{27} = \frac{251}{216} = 1.1620$$

2. Determine the exact sum of the geometric series

$$5 - \frac{10}{3} + \frac{20}{9} - \frac{40}{27} + \dots$$

$$5 \cdot \frac{-2}{3} = -\frac{10}{3} \quad -\frac{10}{3} \cdot \frac{-2}{3} = \frac{20}{9}$$

$$a = 5$$

$$r = -\frac{2}{3}$$

$$\left| -\frac{2}{3} \right| < 1 \quad \checkmark$$

$$S = \frac{a}{1-r}$$

$$S = \frac{5}{1 - (-2/3)} = \frac{5}{1 + 2/3} = \frac{5}{5/3} = 3 \cdot \frac{3}{3} = 3$$

$$S = 3$$

Great!

$$\frac{3}{3} + \frac{2}{3} = \frac{5}{3}$$