MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

SECTION 1.3 | **Math 2000 Worksheet** | WINTER 2020

For practice only. Not to be submitted.

1. Compute (without approximating) the first five terms in the sequence of partial sums for each of the following series.

   (a) $\displaystyle\sum_{i=1}^{\infty} \frac{1-2i}{2-i^2}$

   (b) $\displaystyle\sum_{i=3}^{\infty} \frac{(-1)^i}{i!}$

2. Determine which of the following series must diverge, using the Divergence Test.

   (a) $\displaystyle\sum_{i=1}^{\infty} \left(-\frac{3}{7}\right)^{i+1}$

   (b) $\displaystyle\sum_{i=50}^{\infty} \frac{i^3}{i(4i^2-5)}$

   (c) $\displaystyle\sum_{k=1}^{\infty} \frac{2^k}{5^{k-1}}$

   (d) $\displaystyle\sum_{i=1}^{\infty} i\sin\left(\frac{1}{i}\right)$

3. The nth partial sum of a certain series $\displaystyle\sum_{i=1}^{\infty} a_i$ is $s_n = 5 - \dfrac{2}{n^2}$. What is a_n? Find the sum of the series.

4. For each of the following series, find a formula for the nth partial sum and determine whether the sequence of partial sums has a limit. If so, find the sum of the series.

   (a) $\displaystyle\sum_{i=0}^{\infty} \frac{1}{(i+4)(i+5)}$

   (b) $\displaystyle\sum_{i=1}^{\infty} \left[i^2-(i+1)^2\right]$

   (c) $\displaystyle\sum_{i=2}^{\infty} \frac{2}{i(i-1)(i+1)}$

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5. Find the sum of each of the following convergent series.

   (a) $\displaystyle\sum_{i=1}^{\infty} 4\left(\frac{2}{3}\right)^{i}$

   (b) $\displaystyle\sum_{i=0}^{\infty} \frac{3^i - 4^i}{3^i 4^i}$

   (c) $\displaystyle\sum_{i=1}^{\infty} \left(\frac{2}{5}\right)^{3i}$

   (d) $\displaystyle\sum_{i=1}^{\infty} (-1)^{i-1}(0.2)^{i-1}$

6. Find all values of x for which each of the following series converge. What is the sum of the series (in terms of x) for these values?

   (a) $\displaystyle\sum_{i=0}^{\infty} \frac{(x-6)^i}{4^i}$

   (b) $\displaystyle\sum_{i=1}^{\infty} [\sin(x)]^{i-1}$

7. Express the repeating decimal as a geometric series and write its sum as the ratio of two integers.

   (a) 0.042424242...

   (b) 19.920920920...

8. A ball is dropped from a height of 1 metre onto a smooth surface. On each bounce, the ball rises to 60% of the height it reached on the previous bounce. Find the total distance that the ball travels.