

# MEMORIAL UNIVERSITY OF NEWFOUNDLAND

## DEPARTMENT OF MATHEMATICS AND STATISTICS

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ASSIGNMENT 5

MATH 2000

FALL 2018

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**Due: Wednesday, October 24th, 2018 by 2:00pm. SHOW ALL WORK.**

**Note:** You should complete the worksheets for Sections 1.3 and 2.5 before you work on this assignment.

1. Determine whether each of the following series is convergent or divergent. If the series is convergent, find its sum.

(a) 
$$\sum_{i=0}^{\infty} (-1)^{i-1} \frac{2^{3i+4} - 3^i}{9^{i-1}}$$

(b) 
$$\sum_{i=2}^{\infty} (-1)^{i-1} \frac{2^{3i+4} - 3^i}{9^{i-1}}$$

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

(d) 
$$\sum_{i=1}^{\infty} \frac{4 \cdot 8 \cdot 12 \cdots (4i)}{6 \cdot 12 \cdot 18 \cdots (6i)}$$

2. Find all values of  $x$  for which the series

$$\sum_{i=0}^{\infty} \frac{(4x)^{3i}}{8^i}$$

is convergent. Determine the sum of the series (in terms of  $x$ ) for these values.

3. Express the repeating decimal  $2.018018018\dots$  as a geometric series and write its sum as the ratio of two integers.
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4. For each of the following functions, find and classify any critical points as relative maxima, relative minima or saddle points.

(a)  $f(x, y) = 3 + 2x - 4y + x^2 + 4y^2$

(b)  $f(x, y) = 16xy - 2xy^2 - 8x^2y + x^2y^2$