

# MEMORIAL UNIVERSITY OF NEWFOUNDLAND

DEPARTMENT OF MATHEMATICS AND STATISTICS

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DIFFERENTIAL EQUATIONS

Math 1001 Worksheet

FALL 2019

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**For practice only. Not to be submitted.**

1. Find a particular solution to each differential equation.
  - (a)  $f'(x) - \cos(2x - 1) = 2$ , given  $f\left(\frac{1}{2}\right) = 3$
  - (b)  $f''(x) - \frac{4}{x^2} = 0$ , given  $f(-1) = 3$  and  $f'(1) = 0$
  - (c)  $f''(x) = 3x - 3$ , given  $f(0) = -5$  and  $f(2) = -7$
2. Find all functions  $f(x)$  such that  $f'(x) = 9x^2$  and the line  $y = 36x$  is tangent to the graph of  $f(x)$ .
3. A toy rocket is launched vertically upward from the ground.
  - (a) With what initial velocity must the rocket be launched in order to reach a maximum height of 4410 metres?
  - (b) How long does it take the rocket to achieve this height?
  - (c) What will the rocket's height be after 10 seconds?