SECTION 4.1   **Math 1001 Worksheet**   WINTER 2023

For practice only. Not to be submitted.

1. Find the particular solution to each initial value problem.

   (a) $\dfrac{dy}{dt} + \sqrt{t} = 9, \quad y(0) = 4$

   (b) $\cos^2(t)\dfrac{dy}{dt} + \cos(t) - 1 = 0, \quad y(0) = 0$

   (c) $t^2 f'(t) = \ln(t), \quad f(1) = 2$

   (d) $f''(t) - \dfrac{4}{t^2} = 0, \quad f(-1) = 3 \text{ and } f'(1) = 0$

   (e) $f''(t) = 3t - 3, \quad f(0) = -5 \text{ and } f(2) = -7$

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?