Arts & Science 1D06 Quiz #10

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Full Name: SOLUTIONS Student # :

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Please provide detailed solutions to the problems below. Correct responses without justification may not receive full credit. The use of a calculator is permitted.

[4 marks] (1.) Solve the differential equation.

$$\frac{dy}{dx} = y^2x - 2y^2 + x - 2$$

$\frac{dy}{dx} = (y^2+1)(x-2)$

$\int \frac{1}{y^2+1}dy = \int (x-2)dx$

$\arctan y = \frac{x^2}{2} - 2x + c$

$y = \tan\left(\frac{x^2}{2} - 2x + c\right)$

[6 marks] (2.) Find the solution of the differential equation which satisfies the given initial condition.

$$\frac{dy}{dx} = 6y^2x, \quad y(1) = \frac{1}{25}$$

$\int \frac{1}{y^2}dy = \int 6x\,dx$

$\frac{-1}{y} = 3x^2 + c$

$\frac{-1}{(\frac{1}{25})} = 3(1) + c$

$-25 = 3 + c$

$\Rightarrow c = -28$

$\Rightarrow y = \frac{1}{28 - 3x}$