

NAME: Solution

Consider the Initial Value Problem

$$y' = (1 - 2x)y^2 ; y(0) = -1/6$$

1. Find the solution of the initial value problem in explicit form.
2. Determine the interval of x in which the solution is defined.

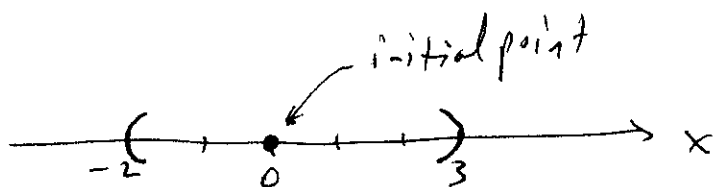
#1) $\frac{dy}{dx} = (1 - 2x)y^2 \Rightarrow \frac{dy}{y^2} = (1 - 2x)dx \Rightarrow -\frac{1}{y} = x - x^2 + C \Rightarrow$

$\Rightarrow y(x) = \frac{1}{x^2 - x - C}$. The initial condition then says
 $y(0) = \frac{1}{-C} = -\frac{1}{6} \Rightarrow C = 6$

Thus, solution of IVP

is $y(x) = \frac{1}{x^2 - x - 6}$

#2) $y(x)$ is undefined at the zeros of the denominator, where $x^2 - x - 6 = 0 \Rightarrow x_{1,2} = \frac{1 \pm 5}{2} = \begin{cases} 3 \\ -2 \end{cases}$



Interval of definition of $y(x)$, that contains the initial point, is $x \in (-2, 3)$.