MM-A1 ODE's Quiz #2A ANSWER KEY.

(1) We have to substitute $f(x) = 1/x$ into the left-hand-side of the equation

$$y'' + 2y^3 = \left(\frac{1}{x}\right)'' + 2\left(\frac{1}{x}\right)^3 = \left(\frac{-1}{x^2}\right)' + \frac{2}{x^3} = \frac{2}{x^3} + \frac{2}{x^3} = \frac{4}{x^3} \neq 0$$

Then, $f(x) = 1/x$ is not solution.

(2) The sol'n to Malthus eq'n. is $P(t) = P(0)\,e^{kt}$.

where $P(0) = 5000$, $P(10) = 60{,}000$. Then $P(0)\,e^{10k} = P(10)$

$$5000\,e^{10k} = 60{,}000 \Rightarrow e^{10k} = 10$$

$$\Rightarrow \boxed{k = \frac{1}{10}\log 10}$$ And: $P(20) = 5000\,e^{20k} = 5000\,e^{2\log 10}$

$$= 5000\,e^{\log(10^2)} = 5000(10^2) = 500\,000$$

$$\boxed{P(20) = 500{,}000}$$ habitantes.

CAM-A ODE's | Quiz #2-B | Answer Key

(1) We have to substitute into left-hand-side of the eq.:

$$\dot{y} - \frac{y}{t} = (3+t^2)^{\cdot} - \frac{(3t+t^3)}{t} = (3+2t) - (3+t)$$

$$= 3-3+2t-t = t,$$ and this equals Right-hand-side. Then, it is solution.

(2) The sol'n is: $P(t) = P(0)e^{kt}$,

with $P(0) = 3,000$, $P(5) = 30,000$.

Then: $3000\, e^{5k} = 30,000 \Rightarrow e^{5k} = 10$

$\boxed{k = \frac{1}{5}\log 10}$. Then: $P(10) = 3000\, e^{(\frac{1}{5}\log 10)10}$

$= 3000\, e^{2\log 10} = 3000\, e^{\log(10)^2} = 3000 \cdot 10^2$

$\Rightarrow \boxed{P(10) = 300,000}$ Habitants: