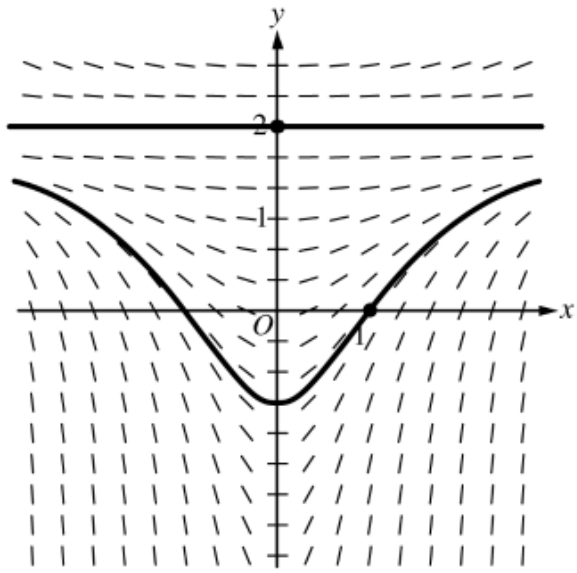
AP® CALCULUS AB
2018 SCORING GUIDELINES

Question 6

(a)



$2 : \begin{cases} 1 : \text{solution curve through } (0, 2) \\ 1 : \text{solution curve through } (1, 0) \end{cases}$

Curves must go through the indicated points, follow the given slope lines, and extend to the boundary of the slope field.

(b) $\left.\dfrac{dy}{dx}\right|_{(x,\,y)=(1,\,0)} = \dfrac{4}{3}$

An equation for the line tangent to the graph of $y = f(x)$ at $x = 1$ is $y = \dfrac{4}{3}(x - 1)$.

$f(0.7) \approx \dfrac{4}{3}(0.7 - 1) = -0.4$

$2 : \begin{cases} 1 : \text{equation of tangent line} \\ 1 : \text{approximation} \end{cases}$

(c) $\dfrac{dy}{dx} = \dfrac{1}{3}x(y-2)^2$

$\displaystyle\int \frac{dy}{(y-2)^2} = \int \frac{1}{3}x\,dx$

$\dfrac{-1}{y-2} = \dfrac{1}{6}x^2 + C$

$\dfrac{1}{2} = \dfrac{1}{6} + C \Rightarrow C = \dfrac{1}{3}$

$\dfrac{-1}{y-2} = \dfrac{1}{6}x^2 + \dfrac{1}{3} = \dfrac{x^2+2}{6}$

$y = 2 - \dfrac{6}{x^2+2}$

Note: this solution is valid for $-\infty < x < \infty$.

$5 : \begin{cases} 1 : \text{separation of variables} \\ 2 : \text{antiderivatives} \\ 1 : \text{constant of integration} \\ \quad\ \text{and uses initial condition} \\ 1 : \text{solves for } y \end{cases}$

Note: $0/5$ if no separation of variables

Note: max $3/5$ [1-2-0-0] if no constant of integration