5. Consider the curve given by $y^2 = 2 + xy$.

   (a) Show that $\dfrac{dy}{dx} = \dfrac{y}{2y - x}$.

   (b) Find all points (x, y) on the curve where the line tangent to the curve has slope $\dfrac{1}{2}$.

   (c) Show that there are no points (x, y) on the curve where the line tangent to the curve is horizontal.

   (d) Let x and y be functions of time t that are related by the equation $y^2 = 2 + xy$. At time $t = 5$, the value of y is 3 and $\dfrac{dy}{dt} = 6$. Find the value of $\dfrac{dx}{dt}$ at time $t = 5$.

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6. Consider the differential equation $\dfrac{dy}{dx} = \dfrac{-xy^2}{2}$. Let $y = f(x)$ be the particular solution to this differential equation with the initial condition $f(-1) = 2$.

   (a) On the axes provided, sketch a slope field for the given differential equation at the twelve points indicated.
   (Note: Use the axes provided in the test booklet.)
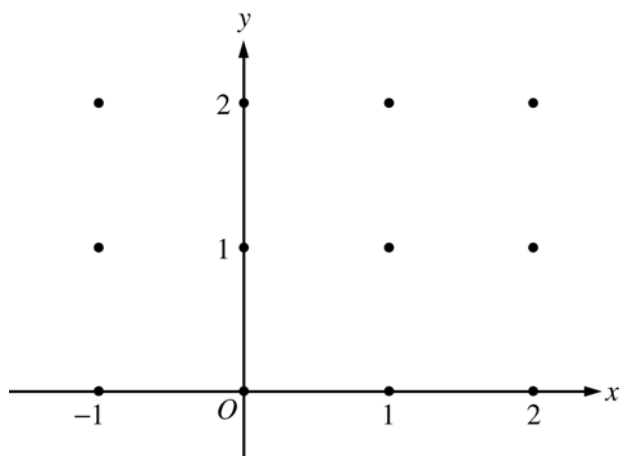
   (b) Write an equation for the line tangent to the graph of f at $x = -1$.

   (c) Find the solution $y = f(x)$ to the given differential equation with the initial condition $f(-1) = 2$.

WRITE ALL WORK IN THE TEST BOOKLET.

END OF EXAM