1) $y'' + x(y')^2 = 0$ $\quad$ ($y' = v$ [illegible]).

$$v' + xv^2 = 0 \qquad => \qquad \frac{dv}{dx} + xv^2 = 0 \qquad => \qquad \frac{dv}{v^2} + xdx = 0$$

$$-\int \frac{dv}{v^2} - \int xdx = 0 \qquad => \qquad \frac{1}{v} - \frac{x^2}{2} = C \qquad => \qquad \frac{dx}{dy} = \frac{x^2}{2} + C \qquad =>$$

$$=> \qquad \frac{dx}{dy} = \frac{x^2 + C}{2} \qquad => \qquad \frac{dy}{dx} = \frac{2}{x^2 + C} \qquad => \qquad dy = \frac{2}{x^2 - C^2} dx \qquad =>$$

$$=> \qquad dy = 2\frac{1}{(x + C)(X - C)} dx$$

$$\frac{1}{(x + C)(X - C)} = \frac{A}{x + C} + \frac{B}{x - C} = \frac{(A + B)x + (B - A)C}{(x + C)(X - C)} \qquad => \qquad B = -A \qquad => \qquad -2AC = 1 \qquad =>$$

$$=> \quad A = -\frac{1}{2C} \qquad => \qquad B = \frac{1}{2C} \qquad => \qquad \frac{1}{(x + C)(X - C)} = \frac{-\frac{1}{2C}}{x + C} + \frac{\frac{1}{2C}}{x - C} = \frac{1}{2C}\left(\frac{1}{x - C} - \frac{1}{x + C}\right)$$

$$dy = 2\frac{1}{2C}\left(\frac{1}{x - C} - \frac{1}{x + C}\right) dx \qquad => \qquad dy = \frac{1}{C}\left(\frac{1}{x - C} - \frac{1}{x + C}\right) dx \qquad =>$$

$$=> \qquad y = \frac{1}{C}\int \left(\frac{1}{x - C} - \frac{1}{x + C}\right) dx \qquad => \qquad y = \frac{1}{C}[\ln(x - C) - \ln(x + C)] + D$$

$$y = \frac{1}{C} \ln \frac{x - C}{x + C} + D$$