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1. Solve

a)  $\frac{dy}{dx} = \frac{x^2}{y^2}$

b)  $\frac{dy}{dx} = x^3y^2$

c)  $\frac{dy}{dx} = \frac{\sin x}{\cos y}$

2. Show that the differential equations

a)  $(xy^2 + y)dx + (x^2y + x)dy = 0$

b)  $(e^x \sin y + 2x)dx + (e^x \cos y + 2y)dy = 0$

are exact and solve them. (It is sufficient to give the solution to the latter equation in implicit form.)

3. Solve initial value problems

a)  $y' = x^3(1 - y)$ , when  $y(0) = 3$ ,

b)  $y' = 2\sqrt{y+1} \cos x$ , when  $y(\pi) = 0$ .

4. Find general solutions to equations

a)  $\frac{dy}{dx} = \frac{y}{x} + 2x + 1$

b)  $\frac{dy}{dx} - y = e^{3x}$

c)  $\frac{dy}{dx} - x - y - 1 = 0$