Partial Differential Equations

Adam's Festive Problem

Let $a, m, r, s \in \mathbb{R}$. Solve the following first order linear partial differential equation boundary value problem:

$$\frac{\partial u}{\partial x} + \frac{3}{s} e^{-r^2} \frac{\partial u}{\partial y} = m\left(\frac{3}{s} - as\right),$$

with boundary condition $u(\alpha, 3\alpha) = \alpha m(3e^{r^2} - as)$ for $\alpha \in \mathbb{R}$.