Problem 1: Compute $F_{rst}$ for $F(r, s, t) = r(s^2 + t^2)$.

\[
F(r, s, t) = r(s^2 + t^2) \\
F_r(r, s, t) = s^2 + t^2 \\
F_s(r, s, t) = 2s \\
F_{rst}(r, s, t) = 0
\]
Problem 2: Show that there does not exist any function $f(x, y)$ such that $f_x(x, y) = xy$ and $f_y(x, y) = x^2$.

Note that $f_{xy}(x, y) = x$ and $f_{yx}(x, y) = 2x$. Both are continuous, but they are not equal. This violates Clairaut’s theorem, so $f(x, y)$ must not exist.