Problem 1: Find the limit \( \lim_{(x,y) \to (0,0)} \frac{x^2 y}{x^4 + y^2} \) or show that it does not exist.

Consider the path \((x, y) = (t, 0)\), which leads to

\[
\lim_{t \to 0} \frac{t^2(0)}{t^4 + 0^2} = \lim_{t \to 0} \frac{0}{t^4} = 0
\]

Considering instead the path \((x, y) = (t, t^2)\) leads to

\[
\lim_{t \to 0} \frac{t^2 t^2}{t^4 + (t^2)^2} = \lim_{t \to 0} \frac{t^4}{2t^4} = \frac{1}{2}
\]

Since two paths to the origin produce different results, the limit does not exist.
Problem 2: Compute $f_{rrs}$ for $f(r, s) = \cos(r + s^2)$.

\[

d(r, s) = \cos(r + s^2) \\
f_r(r, s) = -\sin(r + s^2) \\
f_{rr}(r, s) = -\cos(r + s^2) \\
f_{rrs}(r, s) = 2s \sin(r + s^2)
\]