(1) Evaluate\[ \int_0^2 \int_{2x}^4 xe^{y^2} \, dy \, dx. \]

(2) Evaluate\[ \int \int_D x \, dA, \] where D is the region in the first quadrant that lies between\[ x^2 + y^2 = 4 \] and\[ x^2 + y^2 = 2x. \]