7. $y=1-x^2 \quad y=0 \quad \rho(x,y)=ky$

$D=\{(x,y) \mid x\in[-1,1] \wedge y\in[0,1-x^2]\}$

$m=\int_{-1}^{1}\int_0^{1-x^2} ky\,dy\,dx = \frac{1}{2}\int_{-1}^{1} k(1-x^2)^2\,dx = \frac{k}{2}\int_{-1}^{1} x^4-2x^2+1\,dx$

$= \frac{k}{2}\left(2\left(\frac{1}{5}-\frac{2}{3}+1\right)\right) = \boxed{\frac{8k}{15}=m}$

even function

$\bar{x} = \frac{1}{m}\int_{-1}^{1}\int_0^{1-x^2} xky\,dy\,dx = \frac{k}{2m}\int_{-1}^{1} x(1-x^2)^2\,dx = \frac{k}{2m}\int_{-1}^{1} x^5-2x^3+x\,dx$

$= \frac{k}{2m}(0)=0$

$\bar{y} = \frac{1}{m}\int_{-1}^{1}\int_0^{1-x^2} ky^2\,dy\,dx = \frac{k}{3m}\int_{-1}^{1}(1-x^2)^3\,dx = \frac{k}{3m}\int_{-1}^{1} 1-x^6-3x^2+3x^4\,dx$

$= \frac{k}{3m}\left(2\left(1-\frac{1}{7}-1+\frac{3}{5}\right)\right) = \frac{1}{m}\left(\frac{32k}{105}\right) = \frac{15}{8k}\left(\frac{32k}{105}\right) = \frac{4}{7}$

$\boxed{\left(0,\frac{4}{7}\right)}$

9. $D=\{(x,y) \mid x\in[0,1] \wedge y\in[0,e^{-x}]\}$

$m=\int_0^1\int_0^{e^{-x}} xy\,dy\,dx = \int_0^1 \frac{1}{2}xe^{-2x}\,dx =$ $\quad u=x \quad dv=\frac{e^{-2x}}{2}dx$, $\quad du=dx \quad v=-\frac{e^{-2x}}{4}$

$= \left[-\frac{e^{-2x}}{4}\right]_0^1 - \int_0^1 -\frac{e^{-2x}}{4}\,dx = -\frac{e^{-2}}{4} - \left[\frac{-e^{-2x}}{-8}\right]_0^1 = \boxed{\frac{e^2-3}{8e^2}=m}$

$\bar{x} = \frac{1}{m}\int_0^1\int_0^{e^{-x}} x^2y\,dy\,dx = \frac{1}{m}\int_0^1 \frac{1}{2}x^2e^{-2x}\,dx = \frac{1}{2m}\int_0^1 x^2e^{-2x}\,dx = \frac{1}{2m}\left[\left(\frac{-x^2e^{-2x}}{2}\right)_0^1 + \int_0^1 \frac{xe^{-2x}}{2}\,dx\right]$

$= \frac{1}{m}\left(\frac{-1}{4e^2} - \frac{1}{4e^2} - \int_0^1 \frac{e^{-2x}}{4}\,dx\right) = \frac{1}{m}\left(\frac{-1}{2e^2} - \left(\frac{1}{8e^2}-\frac{1}{8}\right)\right)$

$= \frac{8e^2}{e^2-3}\left(\frac{-4}{8e^2} - \frac{1}{8e^2} + \frac{e^2}{8e^2}\right) = \frac{e^2-5}{e^2-3}$