W203, Test 1

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Q2.1 Solve for the constant
Given that

$$\int_{-\infty}^{+\infty}\int_{-\infty}^{+\infty} f_{X,Y}(x,y)\,dx\,dy = 1 \tag{1}$$

we can write for this case:

$$\int_{x=0}^{x=2}\int_{y=0}^{y=2} c * x^2\,y\,dx\,dy = 1 \tag{2}$$

consequently:

$$c * \Big|_{x=0}^{x=2}\frac{x^3}{3}\Big|_{y=0}^{y=2}\frac{y^2}{2} = \frac{c}{6} * 2^3 * 2^2 = 1 \tag{3}$$

Therefore

$$c = \frac{3}{16}$$