106.

$\text{Cov}(X,Y) = E(XY) - E(X)\cdot E(Y)$

$X \sim U(a,b)$

$f_x(x) = \frac{1}{b-a}$

$X \sim U(0,12) \qquad Y \sim U(0,x)$

$f_x(x) = 1/12 \qquad f_{Y|X}(y|x) = 1/x$

$E(X) = \frac{0+12}{2} = 6$

$E(X) = \frac{a+b}{2}$

$E(Y) = \int_0^{12}\int_0^{x} y \cdot f_{xy}(x,y)\,dy\,dx$

$f_{Y|X}(y|x) = \frac{f_{XY}(x,y)}{f_x(x)}$

$\Rightarrow f_{xy}(x,y) = f_{y|x}(y,x)\cdot f_x(x)$

$f_{xy}(x,y) = \left(\frac{1}{x}\right)\left(\frac{1}{12}\right)$

$E(Y) = \int_0^{12}\int_0^{x} y\cdot\left(\frac{1}{12x}\right)dy\,dx$

$= \int_0^{12} \frac{y^2}{2\cdot 12x}\Big|_0^x\,dx$

$= \int_0^{12} x/24\,dx$

$= x^2/2\cdot 24\Big|_0^{12}$

$= 3$

$E(XY) = \int_0^{12}\int_0^{x} x\cdot y\cdot\frac{1}{12}\cdot\frac{1}{x}\,dy\,dx$

$= \int_0^{12}\int_0^{x} y/12\,dy\,dx$

$= \int_0^{12} y^2/2\cdot 12\Big|_0^x\,dx$

$= \int_0^{12} x^2/24\,dx$

$= x^3/3\cdot 24\Big|_0^{12}$

$= 24$

$\text{Cov}(XY) = E(XY) - E(X)E(Y)$

$= 24 - 6\cdot 3$

$= 6$

C