Oppg. 1)

$$E[X] = \sum_x x f(x)$$

$$= (0 \cdot 0.05) + (1 \cdot 0.10) + (2 \cdot 0.25)$$
$$+ (3 \cdot 0.40) + (4 \cdot 0.15) + (5 \cdot 0.05)$$

$$= \underline{2.65}$$

$$E[X] = \frac{\text{sum}(x)}{n}$$, gjennomsnitt verdier av x.

$$\approx 2.644$$ (i min simulering)

$$P(X \leq 2) \approx 0.404$$

Disse er relativt nærme eksakt verdi, avviker noe.

Oppg. 2a) X = levetid komp.

$$F_X(x) = 1 - \exp\left\{-\frac{x^2}{\alpha}\right\}, \quad x \geq 0$$

$= P(X$ har svikter innen x år$) = P(X \leq x)$

$$f_X(x) = F_X(x)\frac{d}{dx} = \underline{\frac{2}{\alpha}x \cdot e^{-\frac{x^2}{\alpha}}}$$

Fin gitt!

$$E[X] = \int_0^{\infty} x \frac{2}{\alpha} x \cdot e^{-\frac{x^2}{\alpha}} dx = \frac{2}{\alpha}\int_0^{\infty} x^2 e^{-\frac{x^2}{2}}$$

$$= \underline{\frac{\sqrt{\pi}\sqrt{\alpha}}{2}}$$

2(b) $U \sim \text{Unif}[0,1]$

$g(U) = X$

1. $X = F_X^{-1}(U)$

$$U = 1 - \exp\left(-\frac{x^2}{\alpha}\right)$$

$$\exp\left(-\frac{x^2}{\alpha}\right) = 1 - U$$

$$-\frac{x^2}{\alpha} = \ln(1-U)$$

$$g(U) = X = \sqrt{-\alpha \ln(1-U)}$$

2c) $X = F_Y^{-1}(U)$

2c) $X = F_Y^{-1}(U)$

$F_Y(x) = P(Y \leq x)$

$= P(X,$

oppg 3)

$$f_{XY}(x,y)$$

$$f_X(x) = \begin{cases} x = 0 & , \quad \frac{1}{18} + \frac{1}{6} + \frac{1}{18} + \frac{1}{18} = \frac{1}{3} \\ x = 1 & , \quad \ldots \quad = \frac{1}{3} \\ x = 2 & , \quad \ldots \quad = \frac{1}{3} \end{cases}$$

$$f_{Y|X}(y|x) = f_{XY}(x,y) / f_X(x)$$

$$= 3 \cdot f_{XY}(x,y) \quad \ldots$$

$$E[X] = 0 \cdot \frac{1}{3} + 1 \cdot \frac{1}{3} + 2 \cdot \frac{1}{3} = 1$$

$$f_Y(y) = \begin{cases} y = 0, & \frac{3}{18} = \frac{1}{6} \\ y = 1, & \frac{5}{18} \\ y = 2, & \frac{5}{18} \\ y = 3, & \frac{5}{18} \end{cases}$$

$$E[Y] = \frac{5}{18} + 2 \cdot \frac{5}{18} + 3 \frac{5}{18} = \frac{5}{3}$$

$P(Y) \neq P(Y|X)$, de er

ikke uavhengige

oppg 4 a)

$$P(A_i) = \frac{1}{6} + \frac{5}{6}\left(\frac{1}{6} + \frac{5}{6} \cdot \frac{1}{6}\right)$$

$$= 1 - P(\overline{A_i}) = \left(\frac{5}{6}\right)^3$$

$$= 1 - \frac{125}{216} = \frac{91}{216} \approx 0.421$$

$$E(Y_i) = \sum_x x f_{Y_i}(x) = \underline{1 \cdot 0.421}$$

$$Var[Y_i] = E[(Y_i - E[Y_i])^2]$$

$$= \boxed{E[Y_i^2] - E[Y_i]^2} = (1^2 \cdot 0.421) - 0.421^2$$

$$\approx 0.244$$

$$g(Y_i) = 5 \cdot Y_i$$

$$E[X_1] = \sum_x 5x \, f_{Y_i}(x) = 5 \cdot E[Y_i]$$

$$\hat{=} 2.11$$

$$Var[X_1] = E[X_1^2] - E[X_1]^2$$

$$E[X_1^2] = \sum_x x^2 \, P(X_1 = x)$$

$$= 1^2 \cdot \left(3 \cdot \frac{1}{6} + \left(\frac{5}{6}\right)^2\right) + 2^2 \cdot \left(\binom{3}{2} \cdot \left(\frac{1}{6}\right)^2 \cdot \frac{5}{6}\right)$$

$$+ 3^3 \cdot \left(\left(\frac{1}{6}\right)^3\right) = \frac{20}{9} \approx 2.22$$

$$5.88 - 2.11^2 = 1.44$$