

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Electrical Engineering & Computer Science
6.041/6.431: Probabilistic Systems Analysis
(Spring 2006)

Tutorial 1: Answers
February 16-17, 2006

1. (a) $\frac{(25)(20)(15)(10)(5)}{25!}$

(b) $\frac{(25)(16)(9)(4)(1)}{25!}$

2. (a) $a = 28$ and $E[X] = 0$.

(b) $p_Z(z) = \begin{cases} \frac{z}{14} & , \text{ if } z = 0, 1, 4, 9 \\ 0 & , \text{ otherwise} \end{cases}$

(c) $\text{var}(X) = 7$

3. (a)

$$E[U] = aE[X_1] + bE[X_2] + c$$

$$E[V] = a'E[X_1] + b'E[X_3] + c'$$

$$\text{var}(U) = a^2\text{var}(X_1) + b^2\text{var}(X_2)$$

$$\text{var}(V) = a'^2\text{var}(X_1) + b'^2\text{var}(X_3)$$

(b)

$$= E[(U - E[U])(V - E[V])]$$

$$= aa'\text{var}(X_1)$$

$$E[(U - E[U])(W - E[W])] = a''b\text{var}(X_2)$$