

HW6 Solution

1. $P(X=\text{even}) = 5/9$ $P(X=\text{odd}) = 4/9$

$$E[X] = P(X=\text{even})(-1) + P(X=\text{odd})(1) = -1/9 \text{ dollars}$$

2. $P(X=\text{red}) = 1/2$ $P(X=\text{black}) = 1/2$

$$E[X] = 1 \cdot P(X=\text{red}) - 2 \cdot P(X=\text{black})$$

$$= 0.5 - 1$$

$$= -0.5 \text{ dollars}$$

3.	5'6"	\Rightarrow 66"	3/20	= 0.15
	5'8"	\Rightarrow 68"	5/20	= 0.25
	5'10"	\Rightarrow 70"	4/20	= 0.2
	6'0"	\Rightarrow 72"	4/20	= 0.2
	6'2"	\Rightarrow 74"	4/20	= 0.2

$X = \text{Dist. of heights.}$ $E[X] = 66 \cdot 0.15 + 68 \cdot 0.25 + 70 \cdot 0.2$
 $+ 72 \cdot 0.2 + 74 \cdot 0.2$
 $= 70.1''$

4. $E[X] = 1/38 \cdot 35 + 37/38 (-1)$
 $= \frac{2}{38}$
 $= -1/19$

5. $X = R_1 + R_2$ $Y = R_1 - R_2$

$$E(XY) = E((R_1 + R_2)(R_1 - R_2))$$

$$= E[R_1^2 - R_2^2]$$

$$= E[R_1^2] - E[R_2^2]$$

$$E(X)E(Y) = (E(R_1) + E(R_2))(E(R_1) - E(R_2))$$

$$= [E(R_1) + E(R_2)] \cdot 0$$

$$= 0$$

So $E(XY) = E(X)E(Y)$