# Problem Set #5

### ③

$1 \times 1$
$2 \times 2$
$3 \times 3$

| X | 1 | 2 | 3 |
|---|---|---|---|
| P(X=x) | 1/6 | 2/6 | 3/6 |

For 2 rolls:

T = total score rolled

a)

| t | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|
| P(T=t) | 1/36 | 4/36 | 10/36 | 12/36 | 9/36 |

↑ 1,1    ↗ 1,2 or 2,1    1,3 3,1 ↑ 2,2    ↑2,3 3,1    ↑3,3

b) $P(\text{score} > 4) = \dfrac{12}{36} + \dfrac{9}{36} = \boxed{\dfrac{21}{36}}$

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### ④

Rule:
$1 \rightarrow S=2$
$2 \rightarrow S=1$
$3 \rightarrow S=6$
$4 \rightarrow S=2$
$5 \rightarrow S=10$
$6 \rightarrow S=3$

a)

| S | 1 | 2 | 3 | 6 | 10 |
|---|---|---|---|---|---|
| P(S=s) | $\frac{1}{6}$ | $\frac{2}{6}$ | $\frac{1}{6}$ | $\frac{1}{6}$ | $\frac{1}{6}$ |

b) $P(S > 2) = \boxed{\dfrac{3}{6}}$

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### ⑤

| X | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| P(X=x) | $\frac{1}{3}$ | $\frac{1}{3}$ | c | c |

a) $\dfrac{1}{3} + \dfrac{1}{3} + C + C = 1$

$\dfrac{2}{3} + 2C = 1$

$2C = \dfrac{1}{3}$

$C = \dfrac{1}{6}$

b) $P(1 < x < 4) = \dfrac{1}{3} + \dfrac{1}{6}$

$= \dfrac{3}{6} \text{ or } \boxed{\dfrac{1}{2}}$

⑥ $P(Y=y) = Cy^3$ $\quad$ $y = 1, 2, 3$

$1 \to P(1) = C(1)^3 = C$

$2 \to P(2) = C(2)^3 = 8C$

$3 \to P(3) = C(3)^3 = 27C$

| $y$ | 1 | 2 | 3 |
|---|---|---|---|
| $P(Y=y)$ | $C$ | $8C$ | $27C$ |

$C + 8C + 27C = 1$

$$36C = 1$$

$$\boxed{C = \frac{1}{36}}$$