$p_X(k) = P(X = k) = P(X \le k) - P(X \le k - 1)$. But the event $(X \le k)$ occurs when all three dice are $\le k$ and that can occur in k^3 ways. Thus $P(X = k) = k^3/216$.
Similarly, $P(X \le k - 1) = (k - 1)^3/216$. Thus $p_X(k) = k^3/216 - (k - 1)^3/216$.

3.3.12 $F_X(k) = P(X \leq k) = k^3$, as explained in the solution to Question 3.3.3.

3.3.14 $p_X(k) = F_X(k) - F_X(k-1) = \dfrac{k(k+1)}{42} - \dfrac{(k-1)k}{42} = \dfrac{k}{21}$

3.4.2 $P(3/4 \leq Y \leq 1) = \int_{3/4}^{1} \frac{2}{3} + \frac{2}{3} y \, dy = \frac{2y}{3} + \frac{y^2}{3} \Bigg|_{3/4}^{1} = 1 - \frac{11}{16} = \frac{5}{16}$

3.4.12 First note that

$$f_Y(y) = \frac{d}{dy}F_Y(y) = \frac{d}{dy}(4y^3 - 3y^4) = 12y^2 - 12y^3, 0 \le y \le 1$$

Then $P(1/4 < Y \le 3/4)$

$$= \int_{1/4}^{3/4}(12y^2 - 12y^3)dy = (4y^3 - 3y^4)\Big|_{1/4}^{3/4} = 0.6875$$