Answer 2(a)

Range of RV X denotes the set of all possible values that X can take.

$\therefore$ Range = $\{0.2, 0.4, 0.5, 0.7, 1\}$

Answer 2(b)

$P(X \leq 0.5) = 0.2 + 0.1 + 0.1 = 0.4$

To calculate var(X), we have to calculate $E(X)$ & $E(X^2)$

$E(X) = 0.2(0.1) + 0.4(0.1) + 0.5(0.2) + 0.7(0.3) + 1(0.$

$= 0.67$

$E(X^2) = 0.2^2(0.1) + 0.4^2(0.1) + 0.5^2(0.2) + 0.7^2(0.3) + 1^2(0.3)$

$= 0.517$

$\therefore \text{var}(X) = E(X^2) - (E(X))^2$

$= 0.52 - (0.67)^2$

$= 0.0711$

Answer 2(c)

$$P(0.25 \leq X \leq 0.75)$$

$$P_X(x) = 0.1 \quad \text{if} \quad x = 0.4$$
$$P_X(x) = 0.2 \quad \text{if} \quad x = 0.5$$
$$P_X(x) = 0.3 \quad \text{if} \quad x = 0.7$$

$$\therefore P(0.25 \leq X \leq 0.75) = 0.1 + 0.2 + 0.3$$
$$= 0.6$$

Answer 2(b)

$$P(X = 0.2 \mid X < 0.5)$$

$$= \frac{P((X=0.2) \cap (X<0.5))}{P(X<0.5)}$$

from the law of conditional probability, ~~$P(A \cap B)$~~

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

$$= \frac{0.1}{0.1+0.1}$$

$$= 0.5$$