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29th Sept 2020

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Sol. 3. T is a random variable which represents the total worth of the selected coins.

(i) T can assume 3 different values:
If all 3 selected coins are dimes, we get $T = 3\times10 = 30$
If we've selected 2 dimes and 1 nickel, we get $T = 2\times10 + 1\times5 = 25$.
If we've selected 1 dime and 2 nickels, we get $T = 1\times10 + 2\times5 = 20$.
We couldn't have selected 3 nickels and no dimes since there are only 2 nickels in box.

Total no. of ways to make a selection is $\binom{6}{3} = 20$

Since we have choosen 3 coins among 6 from box

(ii) We obtain $T = 30$ when we select 3 dimes from box, which can be done in $\binom{4}{3} = 4$ ways

Since, we are choosing some 3 dimes among 4

$$P(T=30) = \frac{4}{20} = \frac{1}{5}.$$

(iii) We obtain $T = 25$ when we select 2 dimes and 1 nickel from box,
which can be done in $\binom{4}{2}\cdot\binom{2}{1} = 6\times2 = 12$ ways

Since we're choosing some 2 dimes among the 4 and 1 out of 2 in box

$$P(T=25) = \frac{12}{20} = \frac{3}{5}$$

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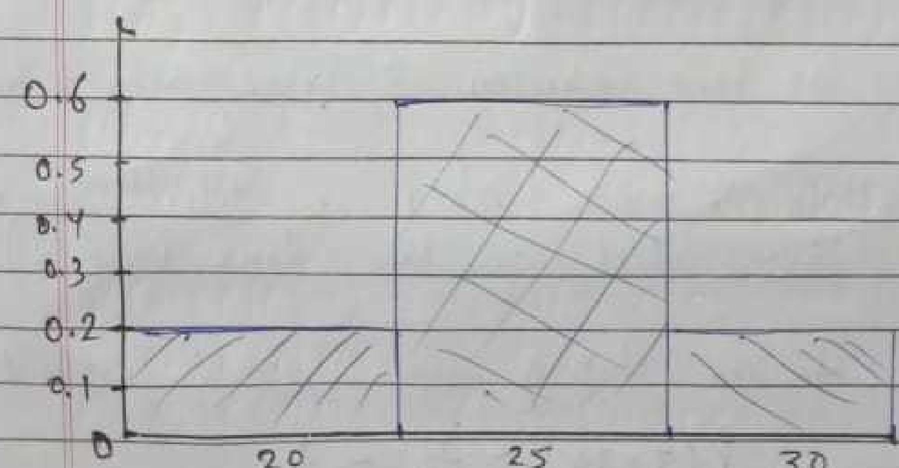
3. (iv) We obtain T = 20 when we select 1 dime and 2 nickels from box, which can be done in $\binom{4}{1} \times \binom{2}{2} = 4 \times 1 = 4$ ways

Since we are choosing single dime among 4 and taking both nickels which are in box

$$P(T=20) = \frac{4}{20} = \boxed{\frac{1}{5}}$$

Now, we obtain the probability distribution

T	20	25	30
f(T)	$\frac{1}{5}$	$\frac{3}{5}$	$\frac{1}{5}$



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Sol.4

X	-3	6	9
$f(X)$	$1/6$	$1/2$	$1/3$

$$\mu_g(x) = \sum_x g(x) f(x) \qquad (x = -3, 6, 9)$$

$$= \sum_x (2x+1)^2 f(x)$$

$$= (2(-3)+1)^2 f(-3) + (2(6)+1)^2 f(6) + (2(9)+1)^2 f(9)$$

$$= 25 \times \frac{1}{6} + 169 \times \frac{1}{2} + 361 \times \frac{1}{3}$$

$$= \frac{25 + 507 + 722}{6}$$

$$= \frac{1254}{6}$$

$$\therefore \mu_g(x) = 209.$$

Sol.1 If X is a random variable which represents the number of green balls drawn in 3 attempts, X can assume values 0, 1, 2 and 3.

Because of replacement of the balls, before each draw there are 4 black balls and 2 green balls in box.

That means, probability of a green ball being drawn is always $\frac{2}{6} = \boxed{\frac{1}{3}}$ while probability of black ball being drawn is $\frac{4}{6} = \boxed{\frac{2}{3}}$

$\therefore$ We obtain probability distribution formula: $P(X=x) = \left(\frac{1}{3}\right)^x \left(\frac{2}{3}\right)^{3-x}$

$$= \boxed{\frac{2^{3-x}}{27}}$$

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Sol. 2.

Consider the following events :

A : the product is defective,
B1 : the product is made by machine B1,
B2 : the product is made by machine B2,
B3 : the product is made by machine B3 .

Applying rule of elimination, we write,

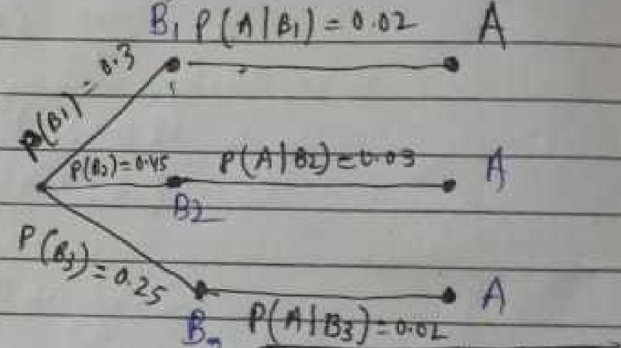

Figure for Q.2

$$P(A) = P(B1)\,P(A|B1) + P(B2)\,P(A|B2) + P(B3)\,P(A|B3)$$

Referring to the diagram of the solution shown above, we find 3 branches give probabilities

$P(B1)\,P(A|B1) = (0.3)(0.02) = 0.006$
$P(B2)\,P(A|B2) = (0.45)(0.03) = 0.0135$
$P(B3)\,P(A|B3) = (0.25)(0.02) = 0.005$ and hence

$$P(A) = 0.006 + 0.0135 + 0.005$$
$$= 0.0245.$$