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f(y) $= \frac{3}{8}y^2$, $0 < y < 2$

1.

a. Mean μ=E[Y]

$\mu = E[Y] = \int_0^2 y f(y)dy$

$$= \int_0^2 y\left(\frac{3}{8}y^3\right)dy$$

$$= \frac{3}{8}\int_0^2 y^3\, dy$$

$$= \frac{3}{8}\left[\frac{y^4}{4}\right]_0^2$$

$$= \frac{3}{8}\left(\frac{2^4}{4} - 0\right)$$

$$= \frac{12}{8}$$

$$\mu = 1.5$$

$$E[Y]^2 = \int_0^2 y^2 f(y)dy$$

$$= \int_0^2 y^2\left(\frac{3}{8}y^2\right)dy$$

$$= \frac{3}{8}\int_0^2 y^4 dy$$

$$= \frac{3}{8}\left[\frac{y^5}{5}\right]_0^2$$

$$= \frac{3}{8}\left(\frac{2^5}{5} - 0\right)$$

$$= \frac{3}{8} \cdot \frac{32}{5}$$

$$= \frac{96}{40}$$

$$=2.4$$

variance σ^2 is:

$\sigma^2 = E[y^2] - (E[y])^2$

$= 2.4 - (1.5)^2$

$= 0.15$

b. Probability of Y>2

$$P(y > 2) = \int_2^{\infty} f(y)dy$$

Since the function is only for 0 < y <2

$$P(y > 2) = 0$$

c. $P(0.5 < Y < 1.5) = \int_{0.5}^{1.5} f(y)dy$

$$= \int_{0.5}^{1.5} \frac{3}{8} y^2 dy$$

$$= \frac{3}{8}\left[\frac{y^3}{3}\right]_{0.5}^{1\cdot 5}$$

$$= \frac{3}{8}\left(\frac{(1.5)^3}{3} - \frac{(0.5)^3}{3}\right)$$

$$= \frac{3}{8}\left(\frac{3.375}{3} - \frac{0.125}{3}\right)$$

$$= \frac{3}{8} .\, 1.08333$$

$$, = 0.40625$$

P(0.5 < Y < 1.5) = 0.406

2.

a.

P(6-8 hours) = 4/20

P(C|6-8 hours) = 2/4

P(6-8 hours, C) = P(6-8 hours). P(C|6-8 hours)

$= \frac{4}{20} \cdot \frac{2}{20}$

$= 0.10$

b.

P(3-5 hours | B) = 1/5

P(B) = 5/20

P(3-5 hours) = 6/20

$P(B|3-5\ hours) = \frac{P(3-5\ hours|B)P(B)}{P(3-5\ hours)}$

$= \frac{\frac{1}{5} \cdot \frac{5}{20}}{\frac{6}{20}}$

$= \frac{1}{6}$
$= 0.167$

3.

P(A) = 0.7
P(B) = 0.3
P(Def | A) = 0.1
P(Def | B) = 0.2

P(B, Def) = P(B) * P(Def | B)
= 0.3 * 0.2
= 0.6

4.

P(M) = 0.6 (Probability of being Male)
P(A) = 0.5 (Probability of being over 30)

P(M, A) = P(M) * P(A)
= 0.5 * 0.6
= 0.3

5.

P(M) = 0.7
P(E) = 0.5
P(M , E) = 0.3

P(M | E) = ?

P(M, E) = P(E) * P(M | E)

$$P(M \mid E) = \frac{P(M, E)}{P(E)}$$
$$= \frac{0.3}{0.5}$$
$$= 0.6$$