HW 3 367 Jahnavi Bonagiri

① $\frac{P(A)}{P(A\cap B)} + \frac{P(B)}{P(A\cap B)} = \frac{1}{P(A)} + \frac{1}{P(B)}$

$\frac{P(A)+P(B)}{P(A\cap B)} = \frac{P(A)+P(B)}{P(A)P(B)} = \frac{P(A)}{P(A)P(B)} + \frac{P(B)}{P(A)P(B)} = \frac{1}{P(A)} + \frac{1}{P(B)}$

$\boxed{P(A)P(B) = P(A\cap B)}$

$\frac{P(A)}{P(A\cap B)} + \frac{P(B)}{P(A\cap B)} = \frac{1}{P(A)} + \frac{1}{P(B)}$

$\frac{P(A)+P(B)}{P(A\cap B)} = \frac{1}{P(A)P(B)} + \frac{1}{P(B)P(A)}$

$\frac{P(A)+P(B)}{P(A\cap B)} = \frac{P(B)+P(A)}{P(A)P(B)} = P(A)P(B)[P(A)+P(B)] =$

$P(A\cap B)[P(B)+P(A)]$

$\boxed{P(A)P(B) = P(A\cap B)}$

② A) $P(A) = \frac{13}{52}$ $P(B) = \frac{13}{52}$ $P(A\cap B) = \frac{13}{52}\cdot\frac{13}{52}$

$\frac{13}{52}\cdot\frac{13}{52} = \frac{13}{52}\cdot\frac{13}{52}$ → Yes, Independent

B) $P(B\cap C) = \left(\frac{13}{52}\right)\times\left(\frac{26}{52}\right)$ $P(B) = \frac{1}{4}$ $P(C) = \frac{1}{2}$ $P(B)P(C) = \frac{1}{8}$

Independent

C) NOT independent. $P(A\cap B\cap C) = P(A)P(B)P(C)$

identity fails.

$\frac{13}{52}\cdot\frac{13}{52}\cdot\frac{1}{2}$ = not independent.

(3) $P(A) = \boxed{6/36}$ $\boxed{\Omega = 6 \cdot 6 = 36}$

combinations: $\boxed{(1,6)(2,5)(3,4)}(4,3)(5,2)(6,1)$ only 3

$P(A \cap B) = \boxed{3/36}$

(4) $\frac{25}{40} \cdot \frac{24}{39} = \boxed{\frac{5}{13}}$

(5) $P(A_1|B) = \frac{(.98)(.04)}{(.98)(.04)+(.03)(.96)} = \boxed{\frac{49}{85}}$

(6) $P(A_1|B) = \frac{(.005)(.95)}{(.005)(.95)+(.995)(.01)} = \boxed{\frac{95}{294}}$