1. a. i. S = "success"

P = "picture"

A = "audio"

$P[S|P) = 1-q \quad P(S|A) = 1-v$

$$P(S|A) = \frac{P(A|S)\ P(S)}{P(A)}$$ bayes

$$\frac{P(S|A) \cdot P(A)}{P(S)} = P(A|S)$$

$P(S|A) = 1-v \quad P(A) = 1-p$

$P(S) = P(S|A)\ P(A) + P(S|P)\ P(P)$

$= (1-v)(1-p) + (1-q)(p)$

$$P(A|S) = \frac{(1-v) \cdot (1-p)}{(1-v)(1-p) + (1-q)\ p}$$

ii. $P(S|A) = 1-v$

$P(S|P) = 1-q$

SSS = "new succ"

$P(SSS|A) = {}^3C_2 \cdot P(S|A) \cdot P(S|A)^2 + {}^3C_3 \cdot P(S|A)^3$

$= 3 \cdot v \cdot (1-v)^2 + 1 \cdot (1-v)^3$

$= (3v - 6v^2 + 3v^3) + (1 - 3v + 3v^2 - v^3)$

$$= \quad 1 - 3v^2 + 2v^3$$

$$P(SSS|p) = \quad \ldots$$

$$= \quad 3 \cdot q \cdot (1-q)^2 + 1 \cdot (1-q)^3$$

$$= \quad 1 - 3q^2 + 2q^3$$

$$P(SSS) = P(SSS|A)\,P(A) + P(SSS|p)\,P(p)$$

$$= \quad (1 - 3v^2 + 2v^3)(1-p) + (1 - 3q^2 + 2q^3)(p)$$