V34 - Hypothesis Testing – Part 10

- Contingency table (used in Test of Independence)
  - Marginal frequencies/totals
  - Cell probabilities

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Contingency Table

	Maui	Kauai	Oahu	TOTAL
High	182	213	203	598
Super High	154	138	110	402
TOTAL	336	351	313	1000

$P(S) = \frac{402}{1000}$ (marginal prob)

- Matrix that cross classifies observations or data based on *categorical variables*
  - Qualitative variables (have categories)
    - Hawaiian Island (3)
    - sweetness rating (2)
  - 203 **High** sweetness pineapples from **Oahu**
  - 1000 total pineapples
- Has **r** rows and **c** columns (r x c table) 2x3
  - r = 2
  - c = 3
  - row and column **totals** called marginal totals or frequencies
  - **Marginal probability** of pineapple being from Maui is $\frac{336}{1000}$
- Used in Test of Independence (HT)

Cell Probabilities

Probability that 2 *independent* events both occur → product of individual probabilities

$P(A_i \cap B_j) = P(A_i)\, P(B_j)$

Theorem 2.11

	Maui	Kauai	Oahu	TOTAL
High	182 1	213 2	203 3	598
Super High	154 4	138 5	110 6	402
TOTAL	336	351	313	1000

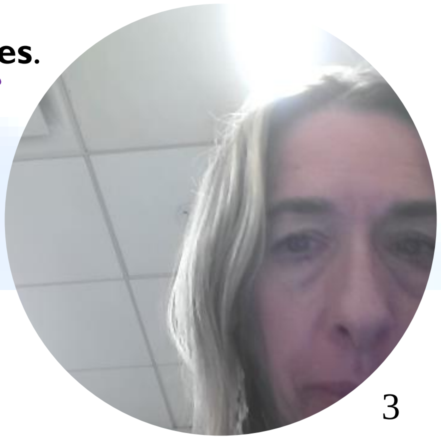
1 2

Assuming H_0 true and variables (origin and sweetness level) are ***independent***, then the following is true:

1. $P(M \cap H) = P(M)P(H) = \left(\frac{336}{1{,}000}\right) * \left(\frac{598}{1000}\right)$
2. $P(M \cap S) =$
3. $P(K \cap H) =$
4. $P(K \cap S) = P(K)P(S) = \left(\frac{351}{1000}\right) * \left(\frac{402}{1000}\right)$
5. $P(O \cap H) =$
6. $P(O \cap S) =$

Products of Marginal probabilities

These are the 6 **cell probabilities.**



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