4. (32 points) A phone manufacturer is considering whether it should switch from Gorilla Glass 4 (GG4) to Gorilla (GG5). They distribute phones with both types of glass to employees. The phones have a drop sensor that blocks usage of the phone and alerts an employee to return the phone if it is dropped. The dropped phones are disassembled, and the damage is classified as: no damage, only glass damaged, only internals damaged, both glass and internals damaged. The results for the first 100 dropped phones are as follows:

	No damage	Only glass	Only internals	Both damaged	Total
GG4	18	13	12	15	58
GG5	24	6	6	6	42
Total	42	19	18	21	100

Conduct a chi-squared contingency test to determine if the manufacturer should feel confident that GG5 offers different performance than GG4.

(a) Show by hand how to analytically calculate the expected value for the "GG4/No damage" entry in the table. (under H_0)

$$Pr(\text{No damage}) = \frac{42}{100}$$

$$E\left[\#\,\text{No damage} \cap GG4\right]$$

$$= \#GG4 \cdot Pr(\text{No damage})$$

$$= 58 \cdot \frac{42}{100} \approx 24.36$$