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Hw 4

Problem 1: Find $P(Manu = A \mid Damaged)$

$P(Manu = A) = \frac{100}{150} = \frac{2}{3}$

$P(Damaged) = \frac{8}{150} = \frac{4}{75}$

$P(Damaged \mid Manu = A) = \frac{5}{100} = \frac{1}{20}$

$= P(Damaged \mid Manu = A) * P(Manu = A)$ / $P(Damaged)$

$= \frac{1}{4} * \frac{2}{3} * \frac{75}{12} = \frac{5}{8} = 0.625$

Problem 3:

Classify instance $y = (Home\_Owner = Yes, Marital = Single, Annual = 95K)$

$P(y \mid BD = no) = P(HO = Yes \mid BD = no) * P(MS = Single \mid BD = no) * P(AI = 95K \mid BD = no)$

$= \frac{3}{7} * \frac{2}{7} * \frac{1}{7} = \frac{6}{343} = 0.0175$

$P(BD = no \mid y) = \frac{P(y \mid BD = no) * P(BD = no)}{P(y)}$

$P(y \mid BD = Yes) = P(HO = Yes \mid BD = Yes) * P(MS = Single \mid BD = Yes) * P(AI = 95K \mid BD = Yes)$

$= \frac{1}{3} * \frac{2}{3} * \frac{1}{3} = \frac{2}{27}$

$P(BD = Yes \mid y) = \frac{P(y \mid BD = Yes) * P(BD = Yes)}{P(y)}$

$P(BD = Yes \mid y) = \frac{\frac{2}{27} * \frac{3}{10}}{P(y)}$ $P(BD = no \mid y) = \frac{\frac{6}{343} * \frac{7}{10}}{P(y)}$

$\frac{\frac{2}{27} * \frac{3}{10}}{P(y)} + \frac{\frac{6}{343} * \frac{7}{10}}{P(y)} = 1$

$P(y) = 0.0345$

$P(BD = no \mid y) = \frac{\frac{2}{27} * \frac{3}{10}}{0.0345} = 0.645$ and $P(BD = Yes \mid y) = 0.355$