

Assignment 6

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#1

1.1 prior prob of catching a fish in a 10-min attempt?

$$P(f) = \frac{20}{100} = \frac{1}{5} = 20\%$$

1.2. Conditional prob $P(\text{raining} | \text{Fish}) = \frac{\left(\frac{5}{7}\right)\left(\frac{7}{100}\right)}{\left(\frac{1}{5}\right)} = \frac{1}{4} = 25\%$

$$1.3 \quad P(\text{rain} | \neg \text{fish}) = \frac{\left(\frac{2}{7}\right)\left(\frac{7}{100}\right)}{\left(\frac{4}{5}\right)} = \frac{1}{40}$$

$$1.4 \quad P(\text{fish} | \text{rain}) = \frac{\left(\frac{1}{4}\right)\left(\frac{1}{5}\right)}{\left(\frac{7}{100}\right)} = \frac{5}{7}$$

1.5.

| | Rain | \neg Rain |
|-------------|-----------------|------------------|
| Fish | $\frac{5}{100}$ | $\frac{15}{100}$ |
| \neg fish | $\frac{2}{100}$ | $\frac{78}{100}$ |

It seems that the two variables, fish caught and was raining are not independent because the product distribution conflicts with what we calculated from the conditional probabilities

1.6

| Rain | \neg Rain | fish | \neg fish |
|-----------------|------------------|------------------|------------------|
| $\frac{7}{100}$ | $\frac{93}{100}$ | $\frac{20}{100}$ | $\frac{80}{100}$ |

| Rain AND | \neg Rain AND |
|-----------------|-------------------|
| $\frac{7}{500}$ | $\frac{372}{500}$ |

#2

2.1 $3^4 = 81$ policies

2.2 $V_{\pi} = \max_a \sum T(s, a, s') [R(s, a, s') + \gamma V(s')]$

| | D | M | L | P | A | K |
|---|--------|-------------------|-------------------|--------|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | $16/5$ | 6 | 6 | $16/5$ | 0 | 0 |
| 2 | $24/5$ | 9 | 9 | $24/5$ | 0 | 0 |
| 3 | $36/5$ | 13.5 | 13.5 | $36/5$ | 0 | 0 |
| 4 | $54/5$ | 20.25 | 20.25 | $54/5$ | 0 | 0 |
| 5 | $81/5$ | 30.375 | 30.375 | $81/5$ | 0 | 0 |
| 6 | 24.3 | 45.56 | 45.56 | 24.3 | 0 | 0 |

2.3 $\pi^*(s) \rightarrow A$

| | |
|----------|---|
| $\pi(D)$ | u |
| $\pi(M)$ | x |
| $\pi(L)$ | x |
| $\pi(P)$ | x |
| $\pi(A)$ | * |
| $\pi(K)$ | * |