|  |  |
| --- | --- |
| X | P |
| +x | 0.5 |
| -x | 0.5 |

|  |  |
| --- | --- |
| Y | P |
| +y | 0.6 |
| -y | 0.4 |

1. a) P

b) P(+x|+y) = 0.33, P(-x|+y) = 0.66, P(-y|+x) = 0.6

|  |  |
| --- | --- |
| X | P |
| +x | 0.75 |
| -x | 0.25 |

c) P(X | Y= -y)

Text, letter

Description automatically generated

1. a)

|  |  |  |
| --- | --- | --- |
| R | T | P |
| +r | +t | 0.08 |
| +r | -t | 0.02 |
| -r | +t | 0.09 |
| -r | -t | 0.81 |

b)

|  |  |  |  |
| --- | --- | --- | --- |
| R | T | L | P |
| +r | +t | +l | 0.024 |
| +r | +t | -l | 0.056 |
| +r | -t | +l | 0.002 |
| +r | -t | -l | 0.018 |
| -r | +t | +l | 0.027 |
| -r | +t | -l | 0.063 |
| -r | -t | +l | 0.081 |
| -r | -t | -l | 0.729 |

|  |  |  |
| --- | --- | --- |
| L | T | P |
| +l | +t | 0.051 |
| +l | -t | 0.083 |
| -l | +t | 0.119 |
| -l | -t | 0.747 |

P(+L) = 0.051+0.083 = 0.134

P(-L) = 0.119+0.747 = 0.866

= 1

1. a) P (A = true) = 0.5

b) P (A = False | b = true) = 0.5

c) Proof:

Two variables are independent if:

1. P(x, y) = P(x)P(y)
2. P(x|y) = P(x)

P(A, B) = 0.25. P(A) = 0.5, P(B) = 0.5. 0.5 \* 0.5 = 0.25

Condition 1 satisfied.

P(A|B) = 0.5. P(A) = 0.5

Condition 2 satisfied.

Therefore, both conditions are satisfied. A and B are independent variables.