Bonus 1

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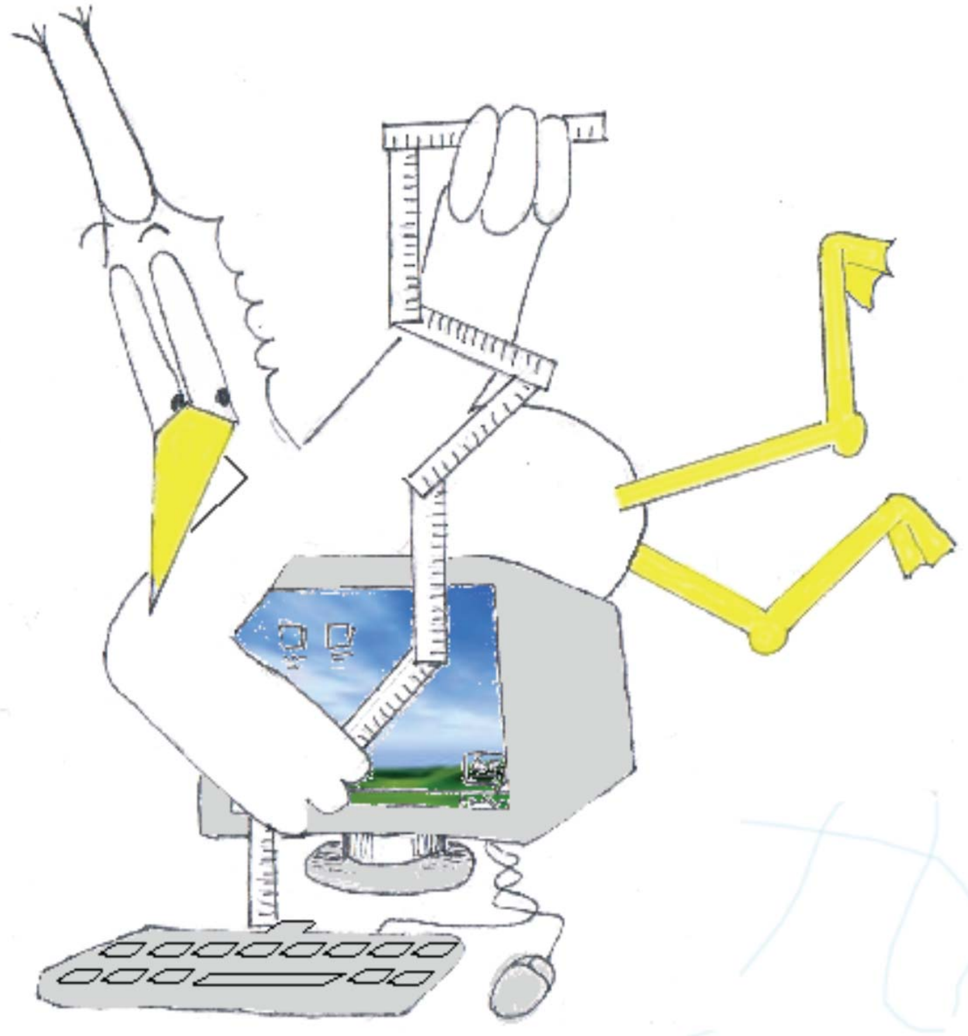
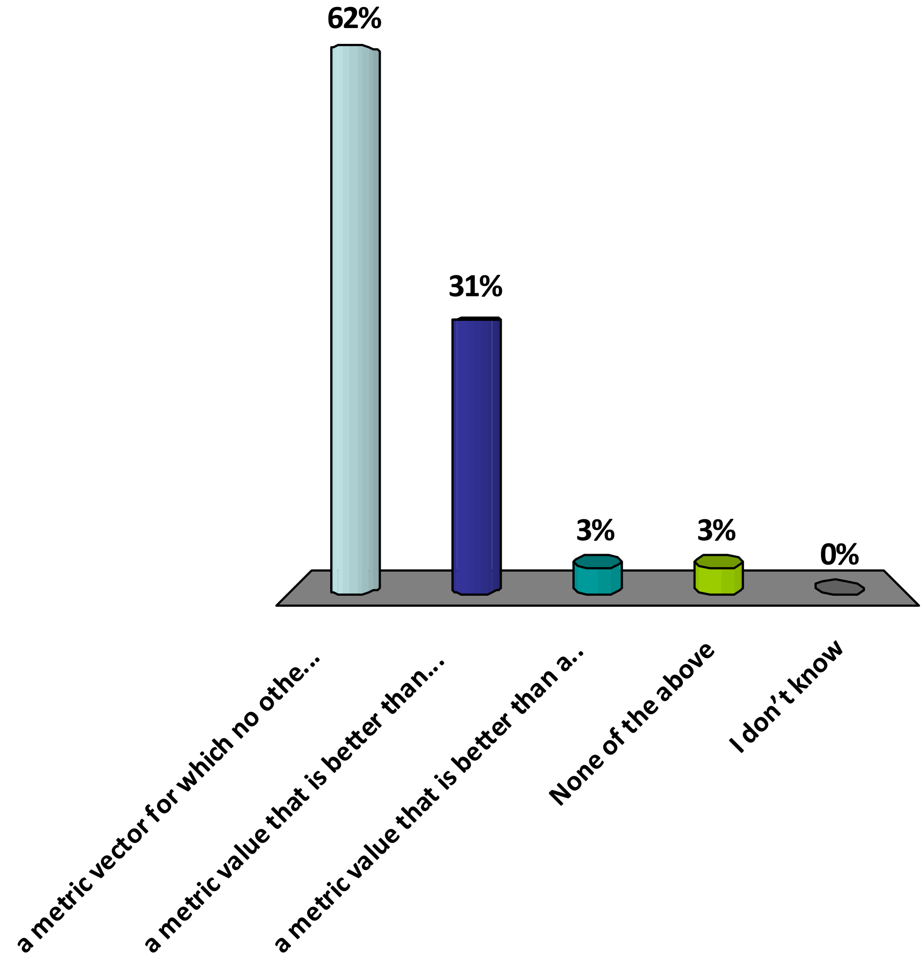
2015



A non-dominated metric means…

1. a metric vector for which no other vector is better
2. a metric value that is better than or equal to all others
3. a metric value that is better than all others
4. None of the above
5. I don’t know

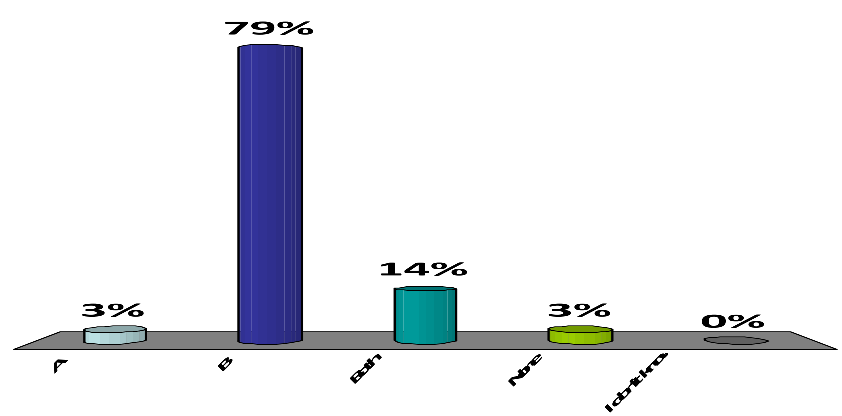


We measure the performance of a radio link as a function of the modulation rate. Day/night is a nuisance factor. Which experimental plan is a proper randomization of the day/night factor ?

A. A
B. B
C. Both
D. None
E. I don’t know

A	Nb of experiments	day	night
	1 Mb/s	20	10
	11 Mb/s	30	15
	55 Mb/s	60	30

B	Nb of experiments	day	night
	1 Mb/s	20	20
	11 Mb/s	20	20
	55 Mb/s	20	20



Solution

A proper randomization should be such that

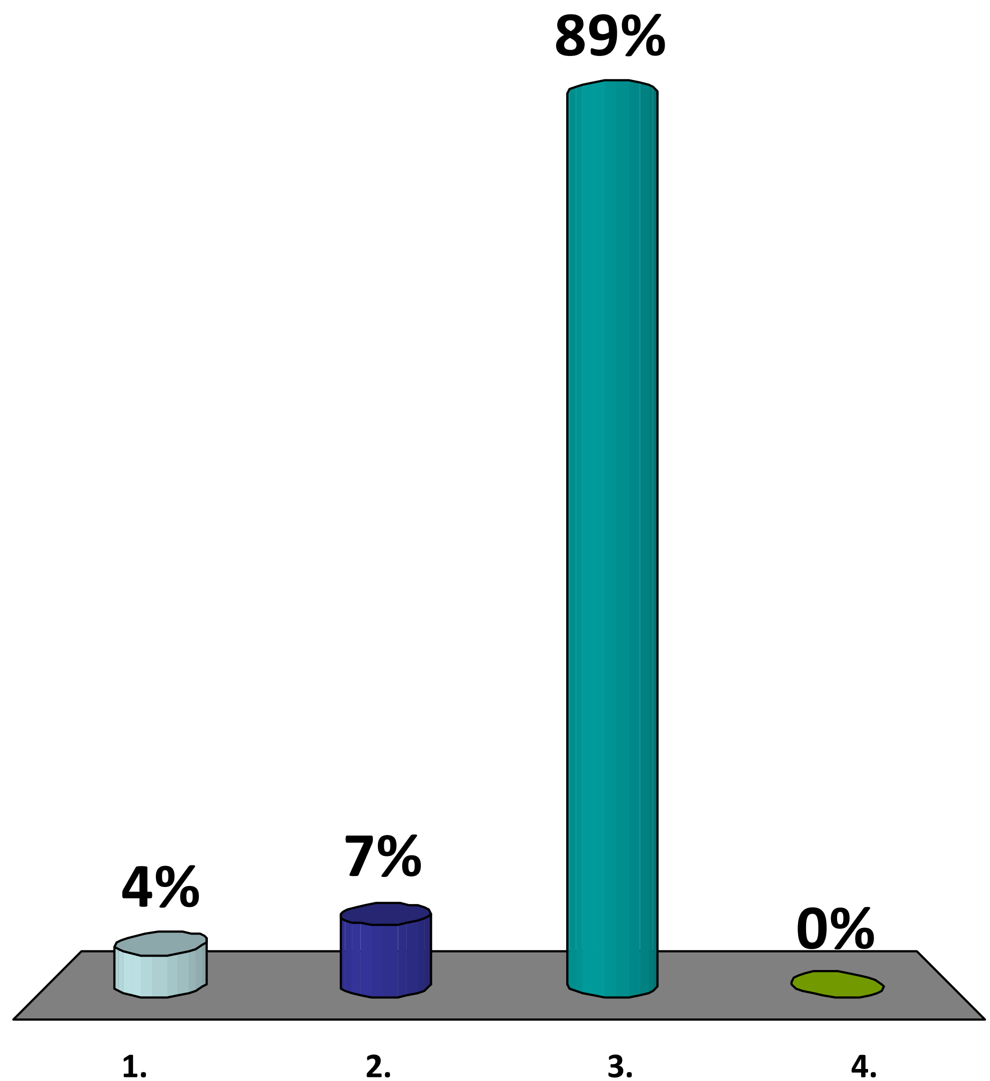
$$P(i|\text{day}) = P(i|\text{night}) \forall i$$

which is true for both A and B.

Answer C

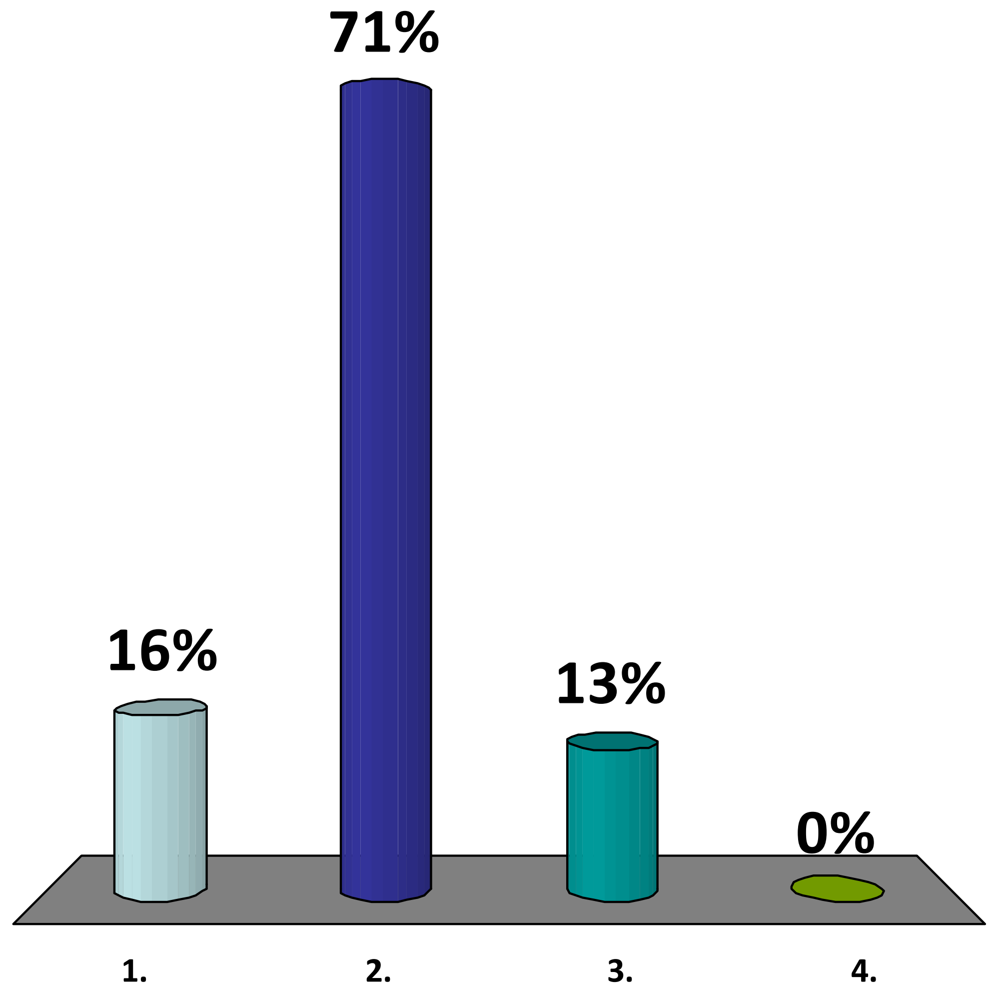
The «scientific method» means

1. Carefully screen all experimental conditions
2. Beware of hidden factors
3. Do not draw a conclusion until you have exhausted all attempts to invalidate it
4. I do not know



A nuisance factor is

1. An unanticipated experimental condition that corrupts the results
2. A condition in the system that affects the performance but that we are not interested in
3. An unpleasant part of the performance evaluation
4. I do not know



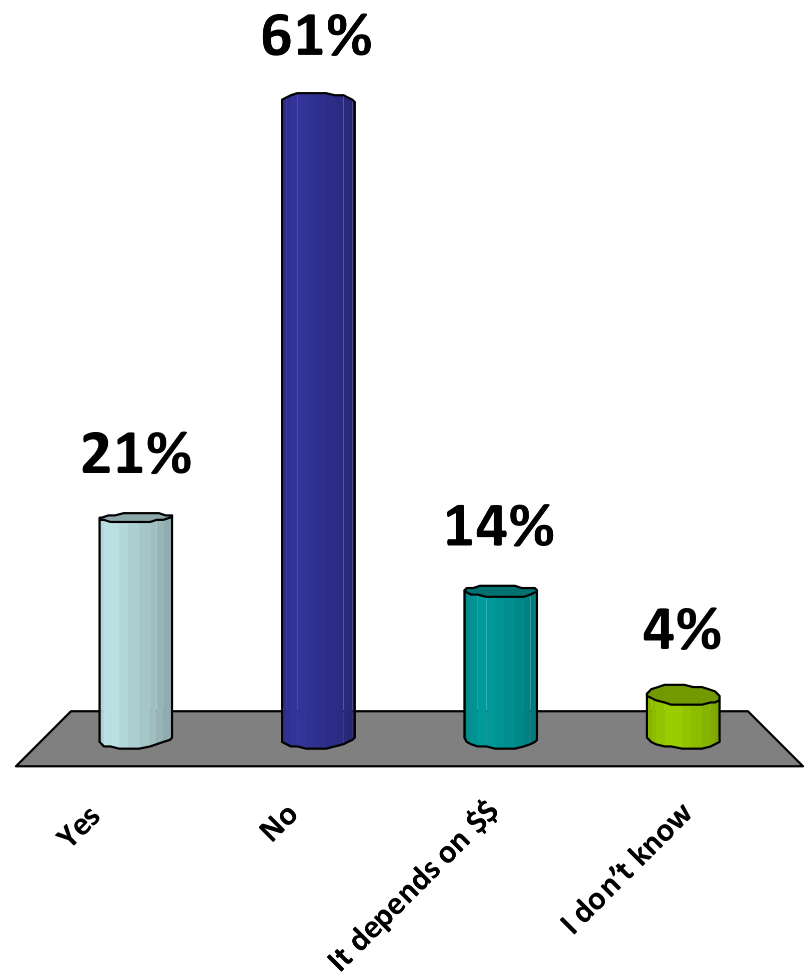
A lazy performance analyst obtains a sequence of results as follows.

- X_1 is a sample of $Poisson(\lambda)$

- to obtain X_n : flip a coin; if TAIL X_n is a sample of $Poisson(\lambda)$ else $X_n = X_{n-1}$

Is the sequence X_n independent ?

A. Yes
B. No
C. It depends on λ
D. I don’t know



Solution

$P(X_2 = j \mid X_1 = i) = 0.5 + 0.5\, p_i$
where p_i is the probability that a $Poisson(\lambda)$ random variable takes the value i

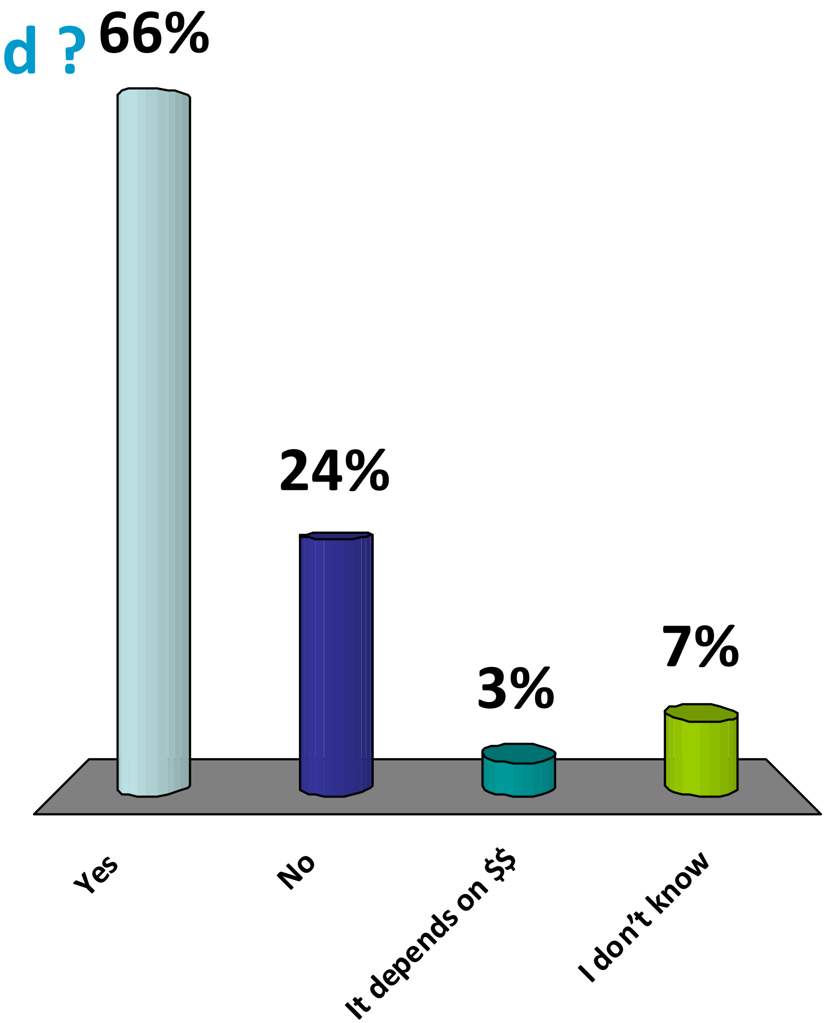
$P(X_2 = j \mid X_1 = i) = 0.5\, p_j$ for $j \neq i$
where p_i is the probability that a $Poisson(\lambda)$ random variable takes the value i

X_1 and X_2 are not independent
Answer B

A lazy performance analyst obtains a sequence of results as follows.
- X_1 is a sample of $Poisson(\lambda)$
- to obtain X_n : flip a coin; if TAIL X_n is a sample of $Poisson(\lambda)$ else $X_n = X_{n-1}$

Is the sequence X_n identically distributed ?

A. Yes
B. No
C. It depends on λ
D. I don't know



Solution

$P(X_2 = j|\ \text{TAIL}) = p_j$

$P(X_2 = j|\ \text{HEAD}) = P(X_1 = j) = p_j$

$P(X_2 = j) = p_j, \forall j$

And so on $P(X_3 = j) = p_j, \forall j, \ldots$

The distribution of X_n is the same as that of X_1

Answer A