LIVE – EXAMPLES A & B

Unit 3A: Probability

(Will also relate to our NEXT topic)

Example A

- Suppose 8% of US adults 20+ years have diabetes (prevalence = 8%).
- If you select *n* people at random from US adults
  - How many would we expect to have diabetes?
  - What is the probability that none of them will have diabetes? at least one?
  - What is the distribution of X=# with diabetes for all possible samples of size n?
    - Where is it centered?
    - How variable is it?

Comments

- Population is large; reasonable that the result of one person will not effect the probability of others – if the sample is truly a random sample (Independent)
- As long as subjects are chosen in a short period, it seems likely the prevalence will remain the same for each selection
- Will Learn: Probabilities can be calculated using
  - Multiplication Rule for Independent Events
  - Binomial Distribution

Example B

- Suppose in a group of 60 subjects, 5 have diabetes.
  - If we select one person at random, what is the probability the person is diabetic?
  - If we select two subjects at random, what is the probability that both are diabetic? None?
  - If we select two subjects at random what is the expected number with diabetes?

Comments

- Since the population is very small, the result of one person will change the subsequent probabilities (dependent)
- Will Learn: Probabilities can be calculated using
  - Conditional Probability
  - General Multiplication Rule

Example A

- Suppose 8% of US adults 20+ years have diabetes (prevalence = 8%).
- If you select *n* people at random from US adults
  - How many would we expect to have diabetes?
  - **What is the probability that none of them will have diabetes? at least one?**
  - What is the distribution of X=# with diabetes in our sample?
  - How variable is the value of X for different samples of the same size?

(will answer the question in bold now, the others later)

Example A

- Suppose 8% of US adults 20+ years have diabetes
- If you select 3 people at random from US adults, **what is the probability that none of them will have diabetes? at least one?**
- Independent events due to large population (if truly randomly selected) – Use multiplication rule for independent events.
- P(None Diabetic) = (0.92)(0.92)(0.92) = 0.7787
- P(At least one Diabetic) = 1 - P(None Diabetic) = 0.2213

Example B

- Suppose in a group of 60 subjects, 5 have diabetes.
  - **If we select one person at random, what is the probability the person is diabetic?**

    P(Diabetic) = 5/60 = 0.0833

  - **If we select two subjects at random, what is the probability that both are diabetic? None?**

    P(Both Diabetic) = (5/60)(4/59) = 0.0056

    P(None Diabetic) = (55/60)(54/59) = 0.8390

  - If we select two subjects at random what is the expected number with diabetes? (will answer later)

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