PES UNIVERSITY, Bangalore

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Department of Computer Science & Engineering

Statistics for Data Science

Assignment – Binomial Distribution

1. An insurance company offers a discount to homeowners who install smoke detectors in their homes. A company representative claims that 80% or more of policyholders have smoke detectors. You draw a random sample of eight policyholders. Let *X* be the number of policyholders in the sample who have smoke detectors.

    a. If exactly 80% of the policyholders have smoke detectors (so the representative's claim is true, but just barely), what is $P(X \leq 1)$?
    b. Based on the answer to part (a), if 80% of the policyholders have smoke detectors, would one policyholder with a smoke detector in a sample of size 8 be an unusually small number?

    c. If you found that one of the eight sample policyholders had a smoke detector, would this be convincing evidence that the claim is false? Explain.
    d. If exactly 80% of the policyholders have smoke detectors, what is $P(X \leq 6)$?
    e. Based on the answer to part (d), if 80% of the policyholders have smoke detectors, would six policyholders with smoke detectors in a sample of size 8 be an unusually small number?
    f. If you found that six of the eight sample policyholders had smoke detectors, would this be convincing evidence that the claim is false? Explain.

2. Choose an appropriate dataset and explore the Binomial distribution conceptually practically using Python.