

IE-341

Section 1, CRN: 62596/62597/80531-91742

Second Semester 1446 (Spring-2025) – 3(2,1,2)
“HUMAN FACTORS ENGINEERING”

Tuesday, January 28, 2025 (28/07/1446H)

Tutorial 3: Information Theory

Name:	Student Number: 44	Section: 9-10
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Answer ALL of the following questions

- 1) An army general is predicting that enemy troops will attack simultaneously on a certain day using land, air, or sea. He is also sure the enemy will **not use a combination** of either attack method, and that either attack is equally likely to occur. Based on the information theory, how much information (in *Bits*) can the general draw from this analysis?

- 2) Assume you are a researcher who has conducted an experiment to determine subject response to hitting either a green or red button after being subjected to different stimuli. It was found that chances a person will hit the green button was 72% and 28% for the red button. Determine the
 - a) Maximum amount of information that can be drawn from this experiment, H_{max}
 - b) Average information, H_{av}
 - c) Degree of redundancy, $\%_{red}$

- 3) Another experiment was conducted on 120 people to study preference in moving a control switch in one of three directions (right, left, or up) as a response to certain different stimuli (e.g. noise or light). It was found that 59 chose to go right, 42 chose up, and the remainder chose left. Determine for this experiment:
 - a) Number and percentage of people in each category (use a table)
 - b) H_{max}
 - c) H_{av}
 - d) $\%_{red}$

4) How much Information (H) is contained in a fair roll of a 6-sided die? If an individual realizes that the die is unfair, with 20% chance of each of 4 sides appearing, and 10% on each of the other two, how does H change?



5) After watching a dice-rolling game, you notice that a one side of a die appears twice as often as it should. All other sides of the die appear with equal probability. Determine the following:

- a) the information that is present in this unfair die
- b) the redundancy present in this unfair die