

INFORMATION THEORY

HOMEWORK # 2:

Please work out the **six** (6) problems stated below – CT refers to the text: Thomas M. Cover and Joy A. Thomsa, *Elements of Information Theory*, Second Edition, John Wiley & Sons, 2006. With this in mind, Problem **2-2** (CT) refers to Exercise 2 for Chapter 2 of CT.

Show work and **explain** reasoning. Two (2) problems, selected at random amongst these six problems, will be marked.

1. _____
Solve Problem **2-7** (CT).

2. _____
Solve Problem **2-9** (CT). Perhaps to confuse matters, recall that with E an arbitrary set, a mapping $d : E \times E \rightarrow \mathbb{R}_+$ is a distance on E if the following conditions are satisfied:

- (i) Symmetry: $d(y, x) = d(x, y)$ for all x, y in E ;
- (ii) Positive definiteness: $d(x, y) = 0$ if and only if $x = y$
- (iii) Triangular inequality: $d(x, y) \leq d(x, z) + d(z, y)$ for all x, y, z in E .

Therefore, what is the natural space on which the function ρ defined in the problem is a metric? Beware!

3. _____
Solve Problem **2-28** (CT).

4. _____
Solve Problem **2-30** (CT).

5. _____
Solve Problem **2-39** (CT).

6. _____
Solve Problem **2-40** (CT).
