# Dated: 20th April 2022

**Due Date: 5th May 2022 (In class) Home Work # 5**

# Total Points 50

**DUALITY ANALYSIS (20 points)**

1. Maximize Subject to

For the above problem,

1. Convert it into its dual (5 points).

MAJU

**Department of Computer Science CS2420: Operations Research Semester Spring 2022**

𝑧 = 7𝑥1 + 12𝑥2 + 4𝑥3

𝑥1 + 2𝑥2 + 𝑥3 ≤ 10 2𝑥1 − 𝑥2 + 3𝑥3 ≤ 8

𝑥1, 𝑥2, 𝑥3 ≥ 0

1. Given B-1 = [2/5 −1/5] and xB=[𝑥2 𝑥1]𝑇, calculate the whole optimal tableau (10 points)

1/5 2/5

1. Calculate the values of the dual variable as well as the optimal value of the dual. (5 points)

# PRIMAL-DUAL CONVERSION (5 points each)

1. Convert the following problems into their dual
   1. Maximize

Subject to

𝑧 = 66𝑥1 − 22𝑥2

* 1. Minimize

Subject to

𝑧 = 6𝑥1 + 3𝑥2

−𝑥1 + 𝑥2 ≤ −2 2𝑥1 + 3𝑥2 ≤ 5

𝑥1, 𝑥2 ≥ 0

# DUAL SIMPLEX ALGORITHM (10 points each)

1. Consider the following set of constraints:

6𝑥1 − 3𝑥2 + 𝑥3 ≥ 25

3𝑥1 + 4𝑥2 + 𝑥3 ≥ 55

𝑥1𝑢𝑟𝑠, 𝑥2, 𝑥3 ≥ 0

Subject to

Minimize 𝑧 = 4𝑥1 + 8𝑥2 + 3𝑥3

1. Consider the following LP: Subject to

𝑥1 + 𝑥2 + 𝑥3 = 7 2𝑥1 − 5𝑥2 + 𝑥3 ≥ 10

𝑥1, 𝑥2, 𝑥3 ≥ 0

Minimize 𝑧 = 2𝑥1 + 2𝑥2 + 4𝑥3 2𝑥1 + 𝑥2 − 𝑥3 ≤ 2

3𝑥1 + 4𝑥2 + 2𝑥3 ≥ 8

𝑥1, 𝑥2, 𝑥3 ≥ 0

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