# CSE 5319/6319 Homework 3

Due April 8, 5:00 p.m. on Canvas

1. Show that the following instance of stable marriages has only one stable matching: (15 points)

| A | B | C | D | E | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 2 | 3 | 3 | 3 | | A | E | D | B | B |
| 1 | 3 | 5 | 2 | 2 | | D | B | B | D | C |
| 3 | 4 | 4 | 4 | 1 | | B | A | C | A | E |
| 4 | 5 | 1 | 5 | 4 | | C | C | E | E | A |
| 2 | 1 | 2 | 1 | 5 | | E | D | A | C | D |

2. Find as many maximum-cardinality, pareto-optimal solutions as you can for the following instance of house allocation: (25 points)

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A1: H4 H5 H2 H1 H3

A2: H2 H5 H4 H3 H1

A3: H1 H4 H2 H3 H5

A4: H4 H2 H1 H5 H3

A5: H3 H2 H4 H1 H5
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3. A man dies, leaving an estate worth $550. The deceased has three widows with marriage contracts of $125, $225, and $325. Divide the estate among the widows, using the Rule of Linked Vessels. (15 points)

4. Solve problem 3 using the O'Neill's law/race-to-the-bank method (Shapley Value). (15 points)

5. A man dies, leaving an estate worth $275. The deceased has three widows with marriage contracts of $50, $100, and $200. Divide the estate among the widows, using the Rule of Linked Vessels. (15 points)

6. Solve problem 5 using the O'Neill's law/race-to-the-bank method (Shapley Value). (15 points)