CS 5722, Fall 2014   **Homework 12**
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1

a

See attached page.

b

The Pareto-Optimal set of solutions is the first three: University of Disney Land, Bedlam College and Hard Knocks U. The only school that is dominated is Space Cadet Academy, which is dominated by the University of Disney Land.

2

a

The following plot was produced using the NSGA II implementation in MATLAB. The weight, f_1 is represented on the x axis, and the deflection, f_2, is represented on the y axis.
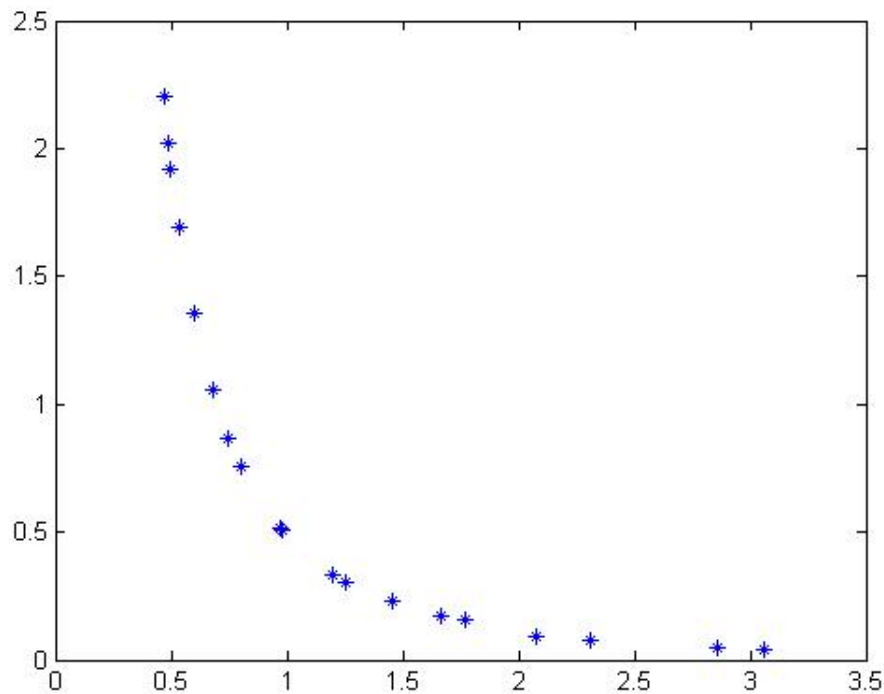
b

The mean of the weight, f_1, for the pareto optimal solutions is 1.3751 kg, and the standard deviation is 0.8813 kg.

c

The mean of the deflection, f_2, for the pareto optimal solutions is 0.7197 mm, and the standard deviation is 0.7348 mm.

d

No, we cannot say which solution is best for the problem. Since this is a multiple objective optimization problem, we don't know which solution on the pareto front may be best for the current problem, as none of them dominate the others.

3

a

From the graphic, we determined that there were three solutions on the first pareto front - d, 4, and 5, and four on the second pareto front, c, e, 3 and 2. To take the top 6 solutions as parents for the next round, we take every solution on the first pareto front, d, 4, and 5, and choose c, 3, and 2 from the second front, as e is the most crowded (closest to two other solutions). As such, our parents for the next round are d, 4, 5, c, 3 and 2.

b

From each pair:

c is chosen over f: Both are in the same front, but c's distance is greater.
2 is chosen over e: 2 is in front 1 but e is in front 2.
3 is chosen over 4: Both are in the same front, but 3's distance is greater.
f is chosen over 5: f is in front 1 but 5 is in front 2.
c is chosen over 3: c is in front 1 but 3 is in front 2.
2 is chosen over e: 2 is in front 1 but e is in fron 2.