• 50 minutes, 3 problems, 30 points, weighted as marked.
• Closed book. Closed notes, except for one side of one 8½ × 11 in. page.
• Unlimited blank scratch paper is allowed.
• Turn in only the attached exam papers.
• Do not detach any of the exam papers.
• Do not write on the backs of the exam papers. Backs WILL NOT be scored. (Work answers on backs or on scratch paper; then write final result onto test paper).
• Your objective is to demonstrate your command of the course subject matter. Your goal is not merely to answer, but to answer well.
1. (10 points) Problem Definition. You are in the business of making OLED TV’s. You have made the decision to develop a high-end external speaker set to offer as an option (the TV’s as-sold will still have their stock speakers, but this plug-in add-on will give the real audiophile an excuse for sending more money to you). Create associated and summarized lists of users, needs, and customer requirements.
2. (10 points) Quality Function Deployment. High-volume detail shops needs hand-held devices for cleaning the insides of car windows. The following Customer Requirements are identified:

- Loosen dirt/grime from glass
- Lift dirt/grime from glass
- Leave car interior clean
- Easily transported from car to car
- Cost-to-operate less than value of saved labor

These CR’s might be met by the following Engineering Characteristics:

- Cleaning solution flow rate
- Scrubbing speed
- Scrubber wetness
- Weight
- Interarrival time to clean a Ford F-250 crew (by one person)
- Purchase price
- Economic lifetime

The EC’s can be met by reference to the following existing alternatives:

- Newspaper wads and Windex spray
- Swifter (adapted to car interiors)

Create a House of Quality and derive target levels for the EC’s.
3. (10 points) Decision Matrix. An engineering student traveling to do field research for an Engineers w/o Borders project needs a bicycle that is:

- Useful for transportation in the campus community
- Easily transportable by commercial aircraft and intercity bus
- Useful for transportation in a developing world extended-village site

Potential solution concepts are:

- Small-wheel folding bike
- Large-wheel folding bike
- Quick-assemble bike kit

Create a weighted decision matrix and evaluate these concepts (explicit use of Belief Maps is not necessary)