# Grade Sheet – 600.145 HW #1

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<th>Name 1: __________________</th>
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<tr>
<th>Problem</th>
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<tr>
<td>Problem 1 – Description</td>
<td>15</td>
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<td>Problem 1 – Tradeoffs</td>
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<td>Problem 1 – Pins vs Pinless</td>
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<td>Problem 2 – Design</td>
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<td>Problem 2 – Tradeoffs/evaluation</td>
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<td>Problem 3 – Approach to implementation</td>
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<td>Totals</td>
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I/we have adhered to the rules on this homework assignment:

__________________________
(signature) (date) (signature) (date)
Homework groundrules

- Work in groups of at most 2 people
- Do not work with other groups on homework
- Do not refer to previous years’ homework
- Include the cover sheet on the homework
- Both students should sign the honor pledge
- You should state what each of you did
600.145 Homework 1, Problem 1 (40 pts)

Discuss the ROBODOC system for total hip replacement surgery:

• Refer to the information flow sketch attached
• (15 pts) For each of the major components, provide a short descriptive paragraph. I.e.,
  – What information is used to represent the patient’s thigh bone in presurgical planning?
  – How is the presurgical planning done?
  – What information is passed on to the execution system?
  – How is the robot registered to the preoperative data and the patient?
  – What does the robot actually do? How is this an advantage, compared to conventional manual surgery?
• (15 pts) Overall, list advantages and disadvantages of Robodoc THR and explain to whom each such factor might be important
• (10 pts) Discuss the trade-offs of the pin and pinless versions from the point-of-view of the patient, surgeon, ins. co., and hospital.
Current Robodoc™ process

Plan
- shape
- place

Preop CT or X-ray

Follow-up

Locate bone by probing surface

Update robot coordinates

Cut cavity with robot

Postop CT or X-Ray

Engineering Research Center for Computer Integrated Surgical Systems and Technology
• (30 pts) Sketch out the design of a non-robotic alternative method for computer-assisted THR. I am not looking for a very detailed design. But I would like a few sketches and a couple paragraphs describing the basic system components and how they would be used in planning, execution, and follow-up, as well as what information passes from one phase to another.

• (20 points) Compare and contrast your proposed solution to Robotic THR. Your discussion should include such elements as cost, accuracy, surgeon convenience, safety, etc. Where would your solution have advantages? Where would the robotic solution have advantages?

• (10 points) Describe how you would go about implementing your proposed design. Here I am looking for a description of what the major milestones might be, what components could be developed in parallel, when components would be integrated, what testing needs doing, etc.