Student Name: _____ Student ID # _____

Question 1: Sensing for Reactive Robots (10 points)

Explain whether you think each of the following is an example of sensor fusion or sensor fission.

A. Any version (your choice) of the reactive robotics code we discussed extensively in class, based on the original code by Jones, et al.

B. Turning to look in the direction of a shout to see if you recognize the shouter.

C. Using sonar and IR proximity sensors to avoid obstacles.

Question 2: Implementing the Reactive Paradigm (20 points)

A. You may want a robot to behave differently when it encounters the same sensory information, depending on the circumstances in which it is found. For example, you may want a robot that "sees" a large green object in front of it to move towards that object when the robot *is* carrying a ball but turn or move away from that object when the robot *is not* carrying a ball.

Explain what code you could reuse between these two behaviors and what code would need to be different for these two behaviors if you were programming using schema theory.

B. *Explain* what code you could reuse from part A if you wanted the robot to move towards tall objects (as detected by a sonar mounted high on your robot) when carrying a ball and turn or move away from tall objects when not carrying a ball.

Question 3: Paradigms and Architectures (40 points)

Consider Jeeves.

A. *Explain* whether you would consider Jeeves to be an implementation of the traditional functional modules decomposition (called the hierarchical paradigm in your textbook), the reactive paradigm, or the hybrid deliberative-reactive paradigm.

B. Given your answer to part A, *explain* which particular architecture within that paradigm Jeeves most closely implements. For example, if you said that Jeeves is an implementation of the reactive paradigm, you should explain whether you think Jeeves most closely implements the subsumption architecture, schema theory, etc. If you said that Jeeves is an implementation of the hybrid deliberative-reactive paradigm, you should explain whether you think Jeeves most closely implements a managerial architecture, a state-hierarchy, etc.

Question 4: Hybrid architectures (30 points)

Consider Xavier.

A. *Explain* the interaction of the Path Planning and Navigation layers.

B. *Explain* the interaction of the Navigation and Obstacle Avoidance layers.