Student Name: _____ Student ID # _____

Question 1: Robotic Paradigms (10 points)

Explain whether you agree with the following statement (taken, with grammatical corrections, from Mowforth and Grant, "From Task-Level Planning to Analogical Navigation"):

"In order to navigate to some goal in an unstructured environment, two things are necessary: planning and perception."

Question 2: The Functional Modules Approach (30 points)

Using the functional modules approach, *explain* what each of the modules would do in a robot designed to carry out the tasks of a mail carrier walking a route. (I.e., the robot will take a sorted load of mail from a starting point, leave appropriate mail in each mailbox in the area, pick up any outgoing mail from each mailbox in the area, and return to the starting point.)

Question 3: Biological Foundations of the Behavior-Based Approach (10 points)

Explain whether each of the following is an example of taxis.

A. Going when you see the traffic signal turn green.

D. Dodging to one side to avoid someone who is trying to tackle you in football. The person is coming at you from in front of you.

D. Coming to class at class time.

E. Swimming towards a tennis ball.

Question 4: More Biological Foundations of the Behavior-Based Approach (10 points)

Explain how you would use schema theory to model the behavior of catching a baseball coming towards you. You only need to consider this one behavior. Be sure to include explanations of all parts of this behavior (sensory input, output of perceptual schema, etc.).

Question 5: The Behavior-Based Approach (40 points)

A. *Explain* in text and diagrams how you would model Elvis (the Dog in "Do Dogs Know Calculus?" by Pennings) using the subsumption architecture. Be sure to draw all modules and the connections between them and to explain how each module works. (You only need to model the actions Elvis takes while playing fetch at the beach as described in the article, not other behaviors in which Elvis engages such as eating, sleeping, and differentiating simple polynomials.)

B. Write code or pseudo-code to implement the model you have presented in part A. Feel free to follow the code examples found in the readings from Brooks (LISP), Murphy (variously described by her as pseudo-code and C), or Jones, et al. (Interactive C) but be sure to give credit as appropriate.