Problem 1

1.2 Read Turing's original paper on AI (Turing, 1950). In the paper, he discusses several objections to his proposed enterprise and his test for intelligence. Which objections still carry weight? Are his refutations valid? Can you think of new objections arising from developments since he wrote the paper? In the paper, he predicts that, by the year 2000 a computer will have a 30% chance of passing a five-minute Turing Test with an unskilled interrogator. What chance do think a computer would have today? In another 50 years? I personally believe that all of the objections brought forth in Turing's paper are still valid to some degree today. I will now briefly describe why for each objection. The Theological Objection still stands because religion is still a major part of society and still influences discourse concerning any kind of 'life'. The 'Heads in the Sand' Objection may not be as prevalent as it was in Turing's time, however, I am confident many people still hold the opinion that men will always be superior. I think the Mathematical Objection will continue to hold while we are still using traditional computing systems. Perhaps the Mathematical Objection will be invalid once we transfer over to newer model of computing (e.g., one based on the human brain). The Argument from Consciousness is among the weakest of the objections today. Computers can already compose beautiful pieces of music (e.g., Emily Howell), but do they computer understand what they have done? That question still remains open. Arguments from Various Disabilities are very interesting to thinking about in todays age. Computers can perform nearly every single task a human can, however, the objection still holds because computers are not capable of emotion. Lady Lovelace's Objection still holds today as well, consider all modern day computing, despite popular belief every single behavior that a computer has is a result of some kind of programming. One can argue that no matter how complex the behavior observed in the computer it is merely following orders. A counterpoint to this object would be that a child does as asked until he or she grows old enough to make their own decisions. The Argument from Continuity in the Nervous System is hottest objection of our time. A popular belief on the discovering of AI is that it will not be possible until we understand the human brain better. Only then can we construct machines which rival the brain. The Argument from Informality of Behavior is still valid but on shaky ground. Computers have become extremely capable inferring and making decisions with everyday choices, however, there is still a lot of ground to be covered. Computer still can not have 'moral code', they make have some base rules for morality but I would argue this is not the same. The Argument from Extra-Sensory Perception is strange in that at first it seems quite ridiculous, I do not believe we can completely dismiss the concerns it until we either completely prove or disprove E.S.P.

Turing's refutations are valid for the most part, however, one could argue that his refutations for The Theological Objection and The 'Heads in the Sand' Objection are completely subjective. In fact after closer analysis while most of refutations are well thought out a decent portion of them are based on conjecture.

Computers with a combination of pre-programmed responses and actual responses exist today and I believe can pass a five-minute Turing Test with an unskilled interrogator. In 50 years, it may possible that all computers can completely pass the Turing Test, I do not believe to be likely.

Problem 2

1.14 Examine the AI literature to discover whether the following tasks can currently be solved by computers:

- Playing a decent game of table tennis (Ping-Pong).

- Driving in the center of Cairo, Egypt.

- Driving in Victorville, California.

- Buying a week's worth of groceries at the market.

- Buying a week's worth of groceries on the Web.

- Playing a decent game of bridge at a competitive level.

- Discovering and proving new mathematical theorems.

- Writing an intentionally funny story.

- Giving competent legal advice in a specialized area of law.

- Translating spoken English into spoken Swedish in real time.

- Performing a complex surgical operation.

For the currently infeasible tasks, try to find out what the difficulties are and predict when, if ever, they will be overcome.

- Yes, actually just recently there was exhibition match between the best ping-pong playing computer and the best ping-pong players.

- Maybe, the Google self-driving car has made huge advances recently. I am sure in a few years this should be possible.

- Yes, the Google self-driving car has already accomplished this.

- No, a robot has not been able to navigate crowded pedestrian areas.

- Yes, this has already been accomplished years ago.

- Yes, most card and table games have already been mastered by computers.

- Yes, there is a system that can prove mathematical theorems, however, it is limited.

- No, while a computer can copy funny ideas it cannot come up with original jokes.

- Maybe, for example a system like IBM Watson maybe able to provide some advice like and expert system would. However, legal advice is mostly interpretation especially an areas that have no pre-existing legal precedence.

- Yes, Google translate does this now.

- Yes, this has been done for some time now.

Problem 3

2.3 For each of the following assertions, say whether it is true or false and support your answer with examples or counterexamples where appropriate.

   a An agent that senses only partial information about the state cannot be perfectly rational.

   b There exist task environments in which no pure reflex agent can behave rationally.

   c There exits a task environment in which every agent is rational.

   d The input to an agent program is the same as the input to the agent function.

   e Every agent function is implementable by some program/machine combination.

   f Suppose an agent selects its action uniformly at random from the set of possible actions. There exists a deterministic task environment in which this agent is rational.

   g It is possible for a given agent to be perfectly rational in two distinct task environments.

   h Every agent is rational in an unobservable environment.

   i A perfectly rational poker-playing agent never loses.

   a False. Rationality is the capability to make an appropriate judgement based on on the information possessed.

   b True. Consider any board game, a reflex agent would not know the state of the board, thus its responses would be the same regardless of the state.

   c True. Consider an environment in which all actions have the same reward.

   d False. The agent function receives input as the entire percept sequence up to the current point. The agent program receives input as the current percept alone.

   e False. See Halting problem which cannot be implemented.

   f True. Selecting random is rational.

   g True.

   h False. No the agent can do something dumb.

   i False. Poker is about chance therefore the agent can lose.

Problem 4

2.4 For each of the following activities, give a PEAS description of the task environment and characterize it in terms of properties listed in Section 2.3.2.

- Playing soccer.

- Exploring the subsurface oceans of Titan.

- Shopping for used AI books on the Internet.

- Playing a tennis match.

- Practicing tennis against a wall.

- Performing a high jump.

- Knitting a sweater.

- Bidding on an item at an auction

- partially observable, stochastic, sequential, dynamic, continuous, multi-agent.

- partially observable, stochastic, sequential, dynamic, continuous, single-agent.

- partially observable, deterministic, sequential, state, discrete, single-agent.

- fully observable, stochastic, episodic, dynamic, continuous, multi-agent.

- fully observable, stochastic, episodic, dynamic, continuous single-agent.

- fully observable, stochastic, sequential, static, continuous, single-agent.

- fully observable, deterministic, sequential, static, continuous, single-agent.

- fully observable, strategic, sequential, static, discrete, multi-agent.

NOTE: I had a really hard time figuring this question and answer out. I did a lot of Googling and used a variety of sources to help me find these answers.