COMP9414: Artificial Intelligence
Solutions 1: Agents

1. Consider autonomous weapons systems, home care robots (important in Japan with an ageing population and undersupply of human carers), self-driving cars (and taxi services).

2. *Key point*: The architecture depends on the specification of the desired behaviour, e.g. a reflexive/reactive approach might be sufficient for Robocup.

3. The robot can become stuck in a cul-de-sac. Now what strategy can the robot use to become "unstuck"?

4. The definition in lectures allows the knowledge of the designer to determine how the agent acts (though each action is based on percepts), even though the agent controls the execution of those actions, for example the delivery robot. Russell and Norvig's definition covers "agents" whose percepts directly cause the agent to "act", e.g. some plankton move around in water but cannot "control" this movement in that they cannot do otherwise (for example, they can only drift with the current but not swim against the current). Whether these creatures have "sensors" is another question. The definition in lectures covers such creatures that have self-control (can propel themselves through water) but no perception.

   Summary: Autonomy is very hard to define, and is closely connected to both choice and control (and free will in humans). Any other suggestions for a definition? It is not easy to define what "perception" is either.

5. One way this can happen is when the agent cannot completely control the action's outcomes, e.g. tossing a coin, where the agent can choose to toss a coin but cannot control (hence cannot choose) to toss a coin heads. So from the agent's point of view, the environment is stochastic (unpredictable). Another is when the agent "fails" to execute the chosen action, e.g. agent tries to go through a doorway but gets stuck. Now how should an agent handle failure?

   This sort of nondeterminism means the environment is unpredictable, even though fully observable and deterministic. Perhaps the agent needs to keep track of multiple future possible states if it wants to do planning.

   Summary: Determinism in the environment is not the same as predictability from the agent's point of view.

6. This might make the test harder to pass, but it still has the same problems as the original Turing Test, in emphasizing fooling the interrogator, and in being about behaviour rather than whether that behaviour is produced in a general way.