編號：F. 576　系所：認知科學研究所　　科目：計算機概論

本試題是否可以使用計算機：□可使用，☑不可使用　（請命題老師勾選）

Choose 5 out of 6 items below to answer.

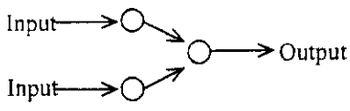
1. (20%) What is an algorithm? According to your definition of algorithm, do you agree or not that abacus (i.e., the traditional Chinese calculating tool) may be thought of as computer? Please explain your reasons.

2. (20%) In programming, two structures are often used: loop and recursion. Are they equivalent or not? Please explain your reasons or give examples.

3. (20%) As we know $e = \sum_{k=0}^{n\to\infty} \frac{1}{k!} = \frac{1}{0!} + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \ldots + \frac{1}{n!} = 2 + \frac{1}{2!} + \frac{1}{3!} + \ldots + \frac{1}{n!}$, please write an algorithm to compute e for $n = 20$ in a loop format. We also know that the recursion structure can do the same thing as the loop structure does. Please rewrite your algorithm in a recursion format. In either case, you do not need to do any calculation.

   Hint 1: The statement of **WHILE** (*not condition*) **DO** (*process*) means to keep on running *process* until *condition* is met. The statement of **If** (*not end condition*) **THEN** (*process*) means if the current condition is not the end condition then run *process*.
   Hint 2: A *process* can be called by itself.

4. (20%) The diagram below shows a simple artificial neural network – perceptron, which can learn most of the Boolean operations, except two. What are the two operations and why? In order to learn these two operations, what adjustments to the structure would you do?



5. (20%) The Turing test (proposed by Alan Turing in 1950) is a way to test if a machine can behave intelligently. In this test, a man is asked to communicate with a test subject – a machine by means of a typewriter system, without being told whether this test subject is a human or a machine. If this man is not able to distinguish it from a human, then the machine is declared to behave intelligently. If a machine passes the Turing test, would you agree that it is intelligent? If not, would you agree that it appears to be intelligent? Please explain your reasons.

（背面仍有題目，請繼續作答）

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6. (20%) A topic which attracts researchers in both fields of artificial intelligence and cognitive psychology is what form of knowledge is for human to behave intelligently. The framework of the model ACT* (Anderson, 1982) is a common example for it. In ACT*, two forms of knowledge are assumed to be used for accomplishing a task: declarative knowledge and procedural knowledge. What are these two forms of knowledge referred to? What are the differences between them? Using an example to explain how these two forms of knowledge work together to accomplish a task.