PART 1: Answer the following 3 questions in English. (50 points)

Extremely Important Note: You may lose credits if you fail to write down the answers in English.

Question 1: (10 points)
With an aid of diagrams, describe the relationships amongst business processes, information systems and information technologies.

Question 2: (10 points)
Describe what "Asia business environment" has been changing since 1980's (1980-1990, 1991-2000, 2001-2010), and how the requirements of an information system are affected by these changes.

Question 3: (30 points)
In accordance with Laudon and Laudon (1996), "An information system is a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization."

Imagine that there will have no more electricity provided in 2012. Computers and networks are no more useful after 2012.

3(a): If this is true, will information system be ‘no more exist’? Why? (5 points)
3(b): If it is possible, what kind of technologies could be used in order to build such an information system? (For Question 3(b), you should write an essay no fewer than 600 words to describe your idea. You might include diagrams to illustrate your idea if necessary.) (25 points)

Reference:
PART 2: Programming Test. (50 points)
There are two questions, Question 4 and Question 5, in PART 2. This part of test is for writing functions, subroutines, class methods, or software programs in a high level programming language (such as C, C++, Ada, Pascal, Java, JavaScript, PHP, Basic, Fortran, COBOL, ... and so on). Remember to specify what high-level programming language you are using to answer each question. In case you are not familiar with any high-level programming language, you may still get partial credits on this test by correctly writing the functions, subroutines, class methods, or software programs in pseudo code.

Question 4: (30 points)
An integer is said to be prime if it is greater than 1 and divisible by only 1 and itself. For example, 2, 3, 5 and 7 are prime, but 4, 6, 8 and 9 are not.

4(a): Write an efficient function that determines whether a number is prime. Make sure this function is efficient by reducing/optimizing the number of mathematics operations. If this function is not efficient, you will lose up to 75% of the points. (20 points)

4(b): Write a program and use the function you derive in 4(a) to determine and print all the prime numbers between 1 and 1,000. (10 points)

Question 5: (20 points)
The Ackermann function $A$ is defined for all non-negative integer arguments $m$ and $n$ as follows:

\[
A(0, n) = n + 1 \quad n \geq 0
\]
\[
A(m, 0) = A(m - 1, 1) \quad m > 0
\]
\[
A(m, n) = A(m - 1, A(m, n - 1)) \quad m, n > 0
\]

Write a function, subroutine, or class method that computes $A(m, n)$ where $m \geq 0$ and $n \geq 0$. 