CMSC330 Practice Problems 8 Solutions

1. Programming languages
   a. Describe how functional programming may be used to simulate OOP.

      An object may be simulated as a tuple, where each element of the tuple is a closures representing a method for the object.

   b. Describe the difference between OCaml modules and Java classes.

      Both provide a public definition for a group of functions whose internal details are hidden, but Java classes can also instantiate objects and inherit attributes from other classes (not possible with OCaml modules).

   c. Describe the difference between strong and weak typing.

      Strong typing prevents types from being used interchangeably, weak typing allows types to be treated as other types through many implicit type conversions.

   d. Explain how call-by-name simplifies implementing lazy evaluation.

      Expressions to be evaluated lazily may be passed as arguments to functions, since function arguments are not evaluated until used.

   e. Describe the difference between an L-value and an R-value.

      L-values refer to the address of a symbol, R-values refer to the value for a symbol.

   f. What is an activation record (frame), and why is it usually allocated on a stack?

      An activation record contains state information for a function invocation. It is usually allocated on a stack so it can be easily freed upon function return by popping the stack.

2. Markup languages
   a. Creating your own XML tags, write an XML document that organizes the following information: 1-hour test on Spanish Monday in Jiménez worth 15%. 1-hour test on Computers Tuesday in CSIC worth 10%. 30-minute test on Computers Friday in AVW worth 5%.
<testList>
  <test>
    <length>1 hour</length>
    <subject>Spanish</subject>
    <date>Monday</date>
    <location>Jiménez</location>
    <value>15%</value>
  </test>
  <test>
    <length>1 hour</length>
    <subject>Computers</subject>
    <date>Tuesday</date>
    <location>CSIC</location>
    <value>10%</value>
  </test>
  <test>
    <length>30 minute</length>
    <subject>Computers</subject>
    <date>Friday</date>
    <location>AVW</location>
    <value>5%</value>
  </test>
</testList>

OR

<testList>
  <test subject="Spanish">
    <length unit="hour">1</length>
    ...
  </test>
  <test subject="Computers">
    <length unit="hour">1</length>
    ...
  </test>
  <test subject="Computers">
    <length unit="minute">30</length>
    ...
  </test>
</testList>