Sheet 5 - Sol

Solve the following *Review Problems* from *Computer Science: An Overview*:

- **2.1**
  a) General purpose registers and main memory cells are small data storage cells in a computer.
  b) General purpose registers are inside the CPU; main memory cells are outside the CPU.
- **2.3**
  Eleven cells
  `98, 99, 9A, 9B, 9C, 9D, 9E, 9F, A0, A1, and A2.`
- **2.4**
  `CD`
- **2.5**

Program Counter	Instruction Register	Memory Cell at 02
02	2211	32
04	3202	32
06	C000	11

- **2.6**
  `x + y + z`:
  LOAD registers 0, 1, and 2 from memory with `x`, `y`, and `z` respectively. ADD the contents of register 0 to the contents of register 1 leaving the result in register 3. ADD the contents of register 2 to the contents of register 3 leaving the result in register 3. STORE the contents of register 3 into memory.
  `(2 x) + y`:
  Rewrite it as `x + x + z` and repeat the steps above.
- **2.7**
  a) OR the contents of register 2 with the contents of register 3 and place the result in register 1.
  b) MOVE the contents of register E to register 1.
  c) ROTATE the contents of register 3 four bits to the right.
  a) JUMP to the instruction at address 00 if the contents of registers 1 and 0 are equal.
  d) LOAD register B with the value (hexadecimal) CD.
- **2.8**
  4 bits: $2^4 = 16$
  6 bits: $2^6 = 64$
- **2.9**
  a) `2677` b) `1677` c) `BA24` d) `A403` e) `81E2`
- **2.29**
  Assume that the instruction is `BRXY`.
  If the pattern in register R is the same as that in register 0, then change the value of the program counter to XY.
- **2.34**

```
a)   111001      b)   000101      c)   001110      d)   111011      e)   111001      f)   010100
   AND 101001        AND 101010        AND 010101        AND 110111     OR 101001      OR 101010
     101001            000000            000100            110011         111001         111110

g)   010100      h)   101010      i)   111001      j)   000111      k)   010000      l)   111111
    OR 101010         OR 110101       XOR 101001        XOR 101010     XOR 010101     XOR 110101
     010101            111111            010000            101101         000101         001010
```

- **2.38**
  What would be the result of performing a 4-bit left circular shift on the following bit patterns?
  a) `11010` b) `00001111` c) `010` d) `001010` e) `10000`