CPS311 - Computer Organization

Addressing Modes

For the examples that follow, assume the registers and memory are set up as follows

```
Register 1 contains 3000

Memory Address      Contents
1000                Do something [ see below ]   <-- The instruction to be executed
...
2000                4000
...
3000                12
3004                73
...
4000                1234
...
5000                5678
```

Direct (Absolute) mode - the instruction contains the address of the operand

> In the above example if the instruction contained 2000, we would use the value at 2000 -> 4000

Memory Indirect (Deferred) mode - the instruction contains the address of a location in memory that contains the address of the operand

> In the above example if the instruction contained 2000, we would use the value at 4000 -> 1234

Register Indirect (Register deferred) mode - the instruction specifies a register that contains the address of the operand

> In the above example, if the instruction specified register 1, we would use the value at 3000 -> 12

Register + Displacement - the instruction specifies a register and a displacement, and these are added to determine the address of the operand

> In the above example, if the instruction specified register 1 with a displacement of 2000,
> we would use the value at (3000 + 2000) -> 5678

PC Relative - the instruction specifies a memory location relative to the value in the program counter (which points to the next instruction)

> In the above example, if the instruction contained 2000, we would use the value at (1004 + 2000) -> 73

Register - the instruction specifies a register that contains the value to be used

> In the above example, if the instruction specified register 1, we would use 3000

Immediate - the instruction contains the value to be used

> In the above example, if the instruction contained 2000, we would use 2000