Quiz 2

```c
int status;
for (int i=0; i<2; i++) {
    pid_t pid = Fork();
    if (pid > 0) waitpid(-1, &status, 0);
    ... some long running code ...
}
```

a) How many processes will be created (exclude the original parent)?
b) Which process will finish first? Why?
c) Which process will finish last? Why?
d) What is the effect of the waitpid( ) call?

Quiz 2 Solution (1)

a) 3 processes are created (excludes original process)
   » If X is the original process, child process IDs are X+1, X+2, and X+3 if system is idle otherwise
b) Process X+2 will finish first
c) X will finish last because it ends up waiting for each of its children to finish before it can proceed
d) waitpid(-1, &status, 0) forces the caller to wait for ANY one of its direct children to finish

Quiz 2 Solution (2)

- Equivalent Code
  ```c
  i = 0;
  pid = Fork();
  if (pid > 0) wait(...);
  i = 1;
  pid = Fork();
  if (pid > 0) wait(...);
  ```

- The state evolution is:
  » where (PID, i, waiting on) denotes the state of a process

  (X, 0, no) ➔ Fork
  (X, 0, X+1)
  and
  (X+1, 0, no) ➔ Fork
  (X+1, 1, X+2)
  and
  (X+2, 1, no) ➔ Done1
  (X+1, 1, no) ➔ Done2
  (X+2, 1, no) ➔ Done3
  (X, 1, no) ➔ Done4