1. Write a regular expression that accepts lines that contain the letter “a” but do not contain the letter “b”.
2. What is the maximum number of child processes, created by the code fragment below, that can coexist simultaneously?

```
for(i = 0; i < 7; i++) {
        if(fork() == 0) {
                sleep(rand() % 10);
                exit(0);
        }
        if(i % 3 == 0) {
                wait(0);
        }
}
```

3. Processes A, B and C communicate through FIFOs X, Y, Z according to the diagram below. Sketch the code fragments that open the FIFOs in the 3 processes.

   A -- X --> B

   B -- Y --> C

   C -- Z --> A

4. How many threads would you use for processing a million files? Justify your choice.
5. Give a set of values for T, N1, N2 and N3 for which the program will end.

```
pthread_barrier_t b1, b2, b3;

void* f1(void* a) {
        pthread_barrier_wait(&b1);
        return NULL;
}

void* f2(void* a) {
        pthread_barrier_wait(&b2);
        return NULL;
}

void* f3(void* a) {
        pthread_barrier_wait(&b3);
        return NULL;
}

int main() {
        int i;
        pthread_t t[T][3];
```

```
        pthread_barrier_init(&b1, N1);
        pthread_barrier_init(&b2, N2);
        pthread_barrier_init(&b3, N3);
        for(i = 0; i < T; i++) {
                pthread_create(&t[i][0], NULL, f1, NULL);
                pthread_create(&t[i][1], NULL, f2, NULL);
                pthread_create(&t[i][2], NULL, f3, NULL);
        }
        for(i = 0; i < T; i++) {
                pthread_join(t[i][0], NULL);
                pthread_ join (t[i][1], NULL);
                pthread_ join (t[i][2], NULL);
        }
        pthread_barrier_destroy(&b1);
        pthread_barrier_destroy (&b2);
        pthread_barrier_destroy (&b3);
        return NULL;
}
```

6. Why I/O operations cause a process to move from the state RUN to the state WAIT?
7. HOW is the address calculation done in the absolute fixed partition allocation?
8. Give an advantage and a disadvantage of the First-Fit placement policy versus the Worst-Fit.
9. What is the most prioritary memory page that rhe NRU replacement policy chooses as victim page?
10. Considering that the size of a block is B and the size of an address is A, how many data blocks are addressed by the triple indirect addressing of an i-node?