Course	COMP-8567	Student Name:
Instructor	B. Boufama	Student Number:
Test 02		Section:

Closed book and no calculators; Answer directly on these sheets;
Do not forget to write your name and your student ID

There are 25 questions, 4 marks each

1. What will be printed by the program below?

```
int main(){
   int a[5]={5, 0, 10, 15, 25}
   int *pt=a+2;
   printf("%d %d %d\n", *(pt+1), *(a+1), pt-a);
}
```

Your answer : 15 0 2

2. What will be printed by the program below?

```
int main(){
   void *pt;
   pt = malloc(2*sizeof(double));
   ((double *)pt)[0] = 3.5;
   ((double *)pt)[1] = 1;
   printf("%lf %lf\n", ((double *)pt)[0], ((double *)pt)[1]);
}
```

Your answer : 3.5 1

3. What will be printed by the program below?

```
void func1(int x){
  printf("%d\n", x*x + 2*x -10);
}
void func2(int x){
  printf("%d\n", 3*x*x - 3*x +1);
}
int main(){
  void (*pt)(int);
  pt=func1;
  pt(1);
  pt=func2;
  pt(1);
}
```

Your answer : -7 1

4. What will be printed by the program below?

```
int *func(){
  static int ar[3]={1, 5, 10};
  return(ar);
}
int main(){
  int *pt=func();
  printf("%d %d\n", *pt, pt[2]);
}
```

Your answer : 1 10

5. Running a program under Bash resulted in a process **P**, with its *pid=2000*. Let **P** create a process **P1** and let **P1** create a process **P2**. What will be the **pgid**s of **P1** and **P2**?
Your answer :

pgid(P1)= 2000 **pgid(P2)=** 2000

6. What will be printed by the program below?

```
int main(int argc, char *argv[]){
  int buffer[4] = {0, 1, 5, 3};
  int *ptr;
  for(ptr=buffer+3; ptr >= buffer; ptr--)
    printf("%d ", *ptr);
}
```

Your answer : 3 5 1 0

7. In a single sentence, what does the shell-script below do?

```
AA=1000000000
for BB in `ls *.$1`; do
      CC=`cat $BB | wc -c`
      if [[ $AA -ge $CC ]]; then # -ge is great or equal
         AA=$CC ; DD=$BB
      fi
done
echo $DD
```

Your answer : find smallest file with extension $1

8. What will be printed by the following bash line?
sort file.txt | **uniq** | **wc -w**, assuming file.txt conatins the following lines:
Prince
King
Queen
Princess
King
Hints: **sort** alphabatically sorts lines of text files and **uniq** omits repeated lines, by keeping a single occurence.
Your answer : 4

9. In a single sentence, what does the program below do?

```
int main(int argc, char *argv[]){
  DIR *dp;
  struct dirent *dirp;
  int n=0;

  dp = opendir("./");
  while( (dirp=readdir(dp))!=NULL)
    if(dirp->d_type == DT_DIR)
       n++;
  printf("%d\n", n)
  closedir(dp);
}
```

Your answer : find the number of directories

10. What will appear on the screen after 6 seconds, when the program below executes:

```
void action(){}
int main(int argc, char *argv[]){
  int pid;
  signal(SIGUSR1, action);
  pid=fork();
  ProcessJob(pid);
}
void ProcessJob(int pid){
  while(1)
    if(pid){
      printf("Parent working\n");
      sleep(1);
      pause();
      kill(pid, SIGUSR1);
    }else{
      pause();
      printf("Child working\n");
      sleep(1);
      kill(getppid(), SIGUSR1);
                }

                }
```

Your answer : Parent working

11. Assuming we cannot use kill to terminate this script, explain in a single sentence how can we terminate it?

```
A=0
trap '
echo Nice try
' TSTP     # TSTP is CTR-Z
trap '
echo Nice try
let "A = $A + 1"
if [[ $A -eq 5 ]]; then
  exit 0
fi
' INT           #INT is CTR-C

while : ; do
  echo Still alive sleep 3
done
```

Your answer : CTR-C 5 times.

12. Correct the following bash script so that it will work properly.

```
dir=/bin/
for BB in `ls  $dir` ; do
      if [ -f $BB ] ; then
         chmod  +x  $BB
      fi
done
```

13. What will appear on the screen when the program below executes:

```
main(){
 int n, status;

   n = 10 + 10*(!fork());

   wait(&status);
   printf("%d\n", n);
   exit(0);
}
```

Your answer : 20 10

14. How many "Hi"s will this program print?

```
main(){
  for(int i=1; i <=2; i++)
    fork();
  if(!fork())
    printf("Hi\n");
}
```

Your answer : 4

15. What will be printed by the following program?

```
int main(int argc, char *argv[]){
  int n, m=-1000, fd, i;
  char data[10][1000];

  fd=open(argv[1], O_CREAT|O_WRONLY|O_TRUNC);
  for(i=0; i< 10; i++)
    write(fd, data[i], 1000);
  n=lseek(fd, m, SEEK_CUR);
  printf("Value= %d\n", n);
}
```

Your answer : value= 9000

16. What will appear on the screen when the following program runs?

```
void action(){};
int main(int argc, char *argv[]){
  alarm(1);
  if(!fork())
    signal(SIGALRM, action);

  sleep(2);
  printf("Friday\n");
  exit(0);
}
```

Your answer : Friday

17. What will be printed by the following program

```
void myHandler(){
  fprintf(stderr, " Night ");
  exit(50);
}
int main(){
  int n;
  signal(SIGALRM, myHandler);
  if(!fork()){
    alarm(1);
    fprintf(stderr, "Morning ");
    sleep(2);
  }
  sleep(1);
  fprintf(stderr, " Afternoon ");
  wait(&n);
  fprintf(stderr, "%d\n", WEXITSTATUS(n));
}
```

Hint: WEXITSTATUS(n) extracts the exit status from variable n
Your answer : Morning Night Afternoon 50

18. What will be printed by the following program

```
void action(){
  fprintf(stderr, "And ");
  exit(0);
}
int main(){

  if(fork()){
    signal(SIGUSR1, action);
    fprintf(stderr, "Butter ");
    pause();
  }else{
    sleep(1);
    kill(getppid(), SIGUSR1);
    exit(0);
   }
  fprintf(stderr, "Bread ");
}
```

Your answer : Butter And

19. What will be printed by the following program

```
void action(){
  fprintf(stderr, "South ");
  exit(0);
}
int main(){
  if(fork()){
    signal(16, action);
    pause();
    fprintf(stderr, "Ottawa ");
  }else{
    fprintf(stderr, "Windsor ");
    sleep(1);
    kill(getppid(), 16);
   }
  sleep(2);
  fprintf(stderr, "%d\n", getppid());
}
```

Your answer : Windsor South 1

20. What will appear on the screen when the following program runs?

```
int main(int argc, char *argv[]){
  if (fork())
    printf("Windsor\n");
  if(!fork())
    pause();
  printf("Bye\n");
  exit(0);
}
```

Your answer : Windsor Bye Bye

21. In a few words, what does the following Bash script do?

```
#!/bin/bash
cat $1 | head -n $2 | tail -n 1
```

Your answer : Display line $2 from file $1

1) **head -n d** delivers the first **d** lines of a file
2) **tail -n d** delivers the last **d** lines of a file

22. What will appear on the screen when the following program runs?

```
int main(int argc, char *argv[]){
  printf("Hello World\n");
  alarm(1)
  sleep(2);
  printf("Bye\n");
  exit(0);
}
```

Your answer : Hello World

23. Consider the program

```
int main(int argc, char *argv[]){
 int fd;
 char buffer1[10] = "One ";
 char buffer2[10] = "Two ";

 fd = open("file.txt", O_WRONLY|O_CREAT|O_TRUNC);
 write(fd, buffer1, strlen(buffer1));
 write(STDOUT_FILENO, buffer2, strlen(buffer2));
 dup2(fd, STDOUT_FILENO); // STDOUT_FILENO is the screen
 write(fd, buffer1, strlen(buffer1));
 write(STDOUT_FILENO, buffer2, strlen(buffer2));
 close(fd);
}
```

- What will appear on the screen?
  Your answer : Two
- What will the file **file.txt** contain?
  Your answer : One One Two

24. What will be printed by the program below?

```
void *Func(void *arg){
  printf("%d\n", *(int *)arg);
  *(int *) arg = 20;
  pthread_exit(arg);
}
int main(){
  pthread_t tid;
  int *tRet=malloc(sizeof(int));
  *tRet=100;
  pthread_create(&tid, NULL, Func, tRet);
  pthread_join(tid, (void **)&tRet);
  printf("%d\n", *tRet);
  exit(0);
}
```

Your answer :