# 1    Answers

1) The difference between the system and fork implementation is that system is blocking
(uses wait) and runs the command via a shell which is not the case for fork.

# 2    Timing test

Here are the time results for 3 different commands : ls, echo and date for 4 different imple-
mentation.

1. system();

```
>/home/ymhedh/Documents/School/Comp/comp 310/A1$ ls
abc     as                hello.c  sh          tinyShell_in.c   tsh
ad      fifo              in.txt   shell       tinyShell_out.c  tshell
a.out  GradingRubric-A1 (2)  myfifo  tinyShell.c  tinySysVfork.c
EXECUTION TIME : 1908067 (ns)

>/home/ymhedh/Documents/School/Comp/comp 310/A1$ date
Sat Oct  6 22:44:12 EDT 2018
EXECUTION TIME : 1531244 (ns)

>/home/ymhedh/Documents/School/Comp/comp 310/A1$ echo OS
OS
EXECUTION TIME : 674981 (ns)
```

2. fork();

```
>/home/ymhedh/Documents/School/Comp/comp 310/A1$ ls
abc     as                hello.c  sh          tinyShell_in.c   tsh
ad      fifo              in.txt   shell       tinyShell_out.c  tshell
a.out  GradingRubric-A1 (2)  myfifo  tinyShell.c  tinySysVfork.c
EXECUTION TIME : 2013254 (ns)

>/home/ymhedh/Documents/School/Comp/comp 310/A1$ date
Sat Oct  6 22:27:19 EDT 2018
EXECUTION TIME : 44562214 (ns)

>/home/ymhedh/Documents/School/Comp/comp 310/A1$ date
Sat Oct  6 22:27:19 EDT 2018
EXECUTION TIME : 44562214 (ns)
```

3. vfork();

```
>/home/ymhedh/Documents/School/Comp/comp 310/A1$ ls
abc    as                hello.c  sh         tinyShell_in.c   tsh
ad     fifo              in.txt   shell      tinyShell_out.c  tshell
a.out  GradingRubric-A1 (2)  myfifo   tinyShell.c  tinySysVfork.c
EXECUTION TIME : 5257523 (ns)

>/home/ymhedh/Documents/School/Comp/comp 310/A1$ date
Sat Oct  6 22:32:44 EDT 2018
EXECUTION TIME : 27928611 (ns)

>/home/ymhedh/Documents/School/Comp/comp 310/A1$ date
Sat Oct  6 22:32:44 EDT 2018
EXECUTION TIME : 27928611 (ns)
```

4. clone();

```
>/home/ymhedh/Documents/School/Comp/comp 310/A1$ ls
abc    as                hello.c  sh         tinyShell_in.c   tsh
ad     fifo              in.txt   shell      tinyShell_out.c  tshell
a.out  GradingRubric-A1 (2)  myfifo   tinyShell.c  tinySysVfork.c
EXECUTION TIME : 2111548 (ns)

>/home/ymhedh/Documents/School/Comp/comp 310/A1$ date
Sat Oct  6 22:37:21 EDT 2018
EXECUTION TIME : 25146943 (ns)

>/home/ymhedh/Documents/School/Comp/comp 310/A1$ echo OS

EXECUTION TIME : 817150 (ns)
```