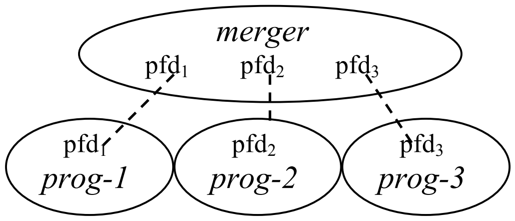
Systems Programming (Fall, 2020)
Hand-written Assignment 3 (Due on 12/9, in class)

1. **Process control & IPC**. Alice plans to write a program *merger* that aggregates the outputs from its child processes. When issuing the following command, she wants *merger* to call *fork*() to create three child processes. Each child process calls *exec*() to execute one program, i.e., *prog-i* (*i*=1..3).

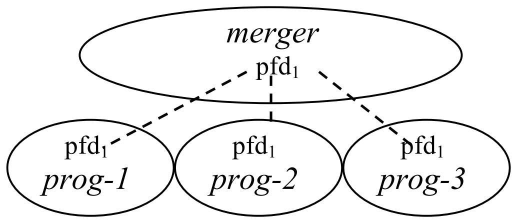
   $ *./merger   prog-1   prog-2   prog-3*

   Each child process is asked to write its output to its standard output. The output will then be sent to *merger* through a pipe. Alice takes two models into account, as shown below, where *pfd*$_j$ (*j*=1..3) is the file descriptor used by *pipe*(). Model 1 has three pipelines while Model 2 has only one. The two models should allow the child processes to send data simultaneously and don't generate any zombie processes. The *merger* program, i.e., *merger.c*, is not complete.

Model 1: multiple 1-to-1 pipelines



Model 2: single 1-to-3 pipeline



```
int main( int argc, char *argv[] )     // merger.c
{
   int i, pid;

   // Section A
   for (i=1; i<argc, i++)
   {
       // Section B
       pid = fork();
        if ( pid == 0 )
        {
            // Section C
            execlp( argv[i], argv[i], (char *) 0 );
        }
       // Section D
   }
   // Section E
}
```

Fill the form to complete the program for supporting Model 1 and Model 2, respectively. Unused file descriptors should be closed. Declare your own variables in Section A. Sections A~E are the places where you put your code in *merger.c*

	Model 1	Model 2
Section A		
Section B		
Section C		
Section D		
Section E		