ECE242, Fall 2002, Section 2, Quiz 2 **Tuesday October 29**

Name: **Student Number:**

1. [**2 marks:**] Choose the smallest complexity class that describes the code fragment below, in terms of the parameter `n`. Choose one of: $O(1)$, $O(\log n)$, $O(\sqrt{n})$, $O(n)$, $O(n \log n)$, $O(n^2)$, $O(n^3)$, $O(2^n)$. Explain your choice.

```
for (i = 1; sqrt(i) < n; i++)
    printf("%d\n", exp(i));
```

   $\sqrt{i} < n$ is equivalent to $i < n^2$ (square both sides of the inequality), so i runs from 1 up to $n^2 - 1$, and the complexity is $O(n^2)$.

2. [**2 marks:**] Program `prog` has its source code in `prog.c`, and it uses functions from module `mod1.o` (with source code in `mod1.c`). Module `mod1.o` uses no functions from `prog`. Declarations for `extern` functions for `mod1.o` are in `mod1.h`. Which files need `#include mod1.h`? Explain your answer.

3. [**2 marks:**] Under what conditions (if any) is the time efficiency of Selection Sort no worse than Merge Sort or Quick Sort? Explain.

4. [**2 marks:**] Which implementation of the queue ADT is most suitable for a "To-do" list where the most recent task is `entered()`ed into the tail of the list, and you know in advance the maximum number of tasks there may be "To-do" at any given time? Explain your choice.

   An array implementation of the queue ADT is feasible if you know in advance the maximum number of elements you must allocate memory for. This implementation gives you $O(1)$ entering and existing of data when implemented as a circular queue.

[End of quiz]