

1994 Paper 7 Question 9

Optimising Compilers

Consider the following ANSI C routine:

```
    struct List { int hd; struct List *tl; };
    struct List *readlist()
    {   int i;
        struct List *p, *q, *t;
11:   p = 0;
12:   while (scanf("%d", &i) == 1)
        {
13:       t = malloc(sizeof(List));
           if (t == 0) abort();
           t->hd = i;
14:       t->tl = 0;
           if (p == 0)
               p = q = t;
           else
               q->tl = t, q = t;
        }
15:   return p;
    }
```

Summarise its function. [4 marks]

Sketch an algorithm which computes liveness of variables. [6 marks]

Calculate the sets of (local) variables which are live at 11, 12, 13, 14 and 15. [4 marks]

Do any of p, q, t and i have dataflow anomalies? Briefly justify your answer indicating which anomalies may represent potential faults. [6 marks]