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;
l1:  p = 0;
l2:  while (scanf("%d", &i) == 1)
     {
l3:      t = malloc(sizeof(List));
         if (t == 0) abort();
         t->hd = i;
l4:      t->tl = 0;
         if (p == 0)
             p = q = t;
         else
             q->tl = t, q = t;
     }
l5:  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 l1, l2, l3, l4 and l5.
                                                                            [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]

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