Optimising Compilers

Consider the following ANSI C routine:

```c
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]