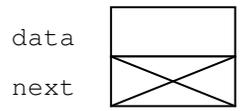


The struct defined on the left is depicted by the diagram on the right. When data member **next** is the null pointer it will be shown as an **X**.

```

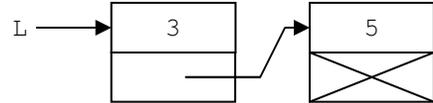
struct node_t
{
    int data;
    node_t *next;
};
    
```



1. (a) Starting with the diagram on the right, draw a new diagram depicting the situation existing after the following sequence of statements is performed:

```

node_t *p = new node_t;
p->data = 2;
p->next = L;
L = p;
    
```

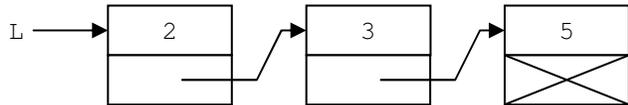


(b) (In English) describe what the above code does:

2. (a) Starting with the diagram on the right, draw a new diagram depicting the situation existing after the following sequence of statements is performed:

```

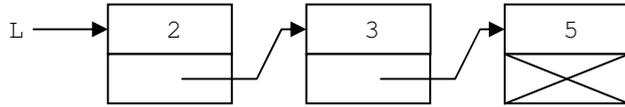
node_t *p = L;
L = L->next;
delete p;
    
```



(b) (In English) describe what the above code does:

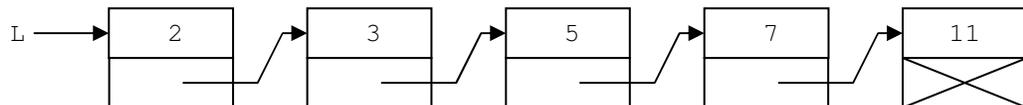
3. (a) Starting with the diagram on the right, draw a new diagram depicting the situation existing after the following sequence of statements is performed:

```
node_t *p = L;
while( p->next != 0 )
    p = p->next;
node_t *tmp = new node_t;
tmp->data = 7;
tmp->next = p->next;
p->next = tmp;
```



(b) (In English) describe what the above code does:

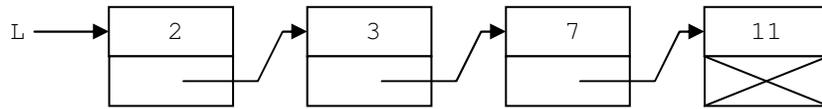
4. (a) Assuming L is as shown in the diagram, write the output produced by the following sequence of statements:



```
node_t *p = L;
while( p != 0 )
{
    cout << p->data << " ";
    p = p->next;
}
```

(b) (In English) describe what the above code does:

5. (a) Starting with this diagram, draw a new diagram depicting the situation existing after the following sequence of statements is performed:

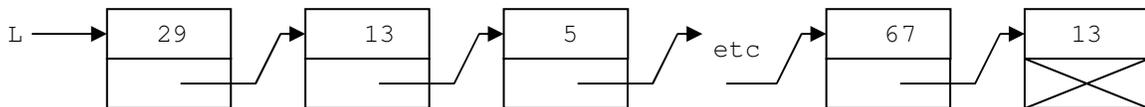


```

node_t *q = new node_t;
q->data = 5 ;
q->next = 0 ;
node_t *p = L ;
while( p->next->data < q->data )
  p = p->next;
q->next = p->next;
p->next = q;
  
```

(b) (In English) describe what the above code does:

6. (a) What does the following iterative function **mystery** accomplish?



```

int mystery( node_t *L )
{
  int n = 0;
  while( L != 0 )
  {
    n++;
    L = L->next;
  }
  return n;
}
  
```

(b) Re-write **mystery** so it accomplishes the same thing *recursively*: