計算機韌體實驗（P19）
醜數/Ugly Numbers

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優先佇列: priority queue

- priority_queue<*type*>是一個越小的物件優先順序越低的優先佇列
  - priority_queue is define in <queue>

```
19      priority_queue<long long> pq;//愈小的(整數)優先權愈低
```

- 主要運算
  - push
  - pop

解題要訣

- 最小的醜數是1
- 對於任意醜數x, 其倍數$2x$, $3x$, 和$5x$也都是醜數
- 如何由小到大依序輸出醜數?
  - 將x的相反數$-x$推入優先佇列

從小到大輸出醜數

```
26      pq.push(-1); Member Function
27      s.insert(-1);
28      for(i=1;;i++){
29          x = pq.top(); Member Function
30          pq.pop(); Member Function
31
32          if(i == 1500){
33              cout << "The 1500'th ugly number is " << -x << "." << endl;
34              break;
35          }
36          for(j=0; j<sizeof(coef)/sizeof(int); j++){
37              x0 = x * coef[j]; //compute 2x, 3x, 5x
38              if(!s.count(x0)){
39                  s.insert(x0);
40                  pq.push(x0);
41              }
42          }
43      }
```

將1的相反數-1推入優先佇列

```
20      set<long long> s;
23      int coef[] = {2, 3, 5}; //2x, 3x, 5x
```

*Member Function*s (1/2)

- void priority_queue::push(const value_type &val);
  - Insert a copy of val into the priority queue and then sort
- value_type priority_queue::top(void);
  - Return a reference to the smallest element in the priority queue

Member Functions (2/2)

- void priority_queue::pop(void);
  - Remove the element on the top of the queue, effectively reducing its size by one