Assignment3

1.(Multiple choice) Assume there is a decider M, and a language L(M) recognized by M. Which of the following statements is/are true? （2 marks）

A. M must be a Turing Machine.

B. L(M) must be a finite set.

C. L(M) must be Turing-decidable.

D. L(M) must be Turing-recognizable.

E. M will halt on all inputs.

2.Give the big-O estimates for the following functions: (3 marks)

1) $2n\ (n^2+ 1)$

2) $n^2/5 + 10n\log n$

3) $f(n)=1^3+2^3+3^3+4^3+\ldots\ldots+n^3$

3. Ordering the following functions by order of growth.(2 marks)

$(1.5)^n$

$\log (\log n)$

$2n$

$8n^3+ 17n^2$

4. Does the following algorithm have a polynomial or nonpolynomial time complexity?

```
FACTORIAL(n)
if n=1 then
    return 1
else
    return n * FACTORIAL(n-1)
end
```