

METCS566 - HOMEWORK #2

1) True or false?

- a. $n^2 = O(n^3)$
- b. $2n^2 + 1 = O(n^2)$
- c. $\sqrt{n} = O(\log n)$
- d. $\log n = O(\sqrt{n})$
- e. $\log n + \sqrt{n} = O(n^2)$
- f. $\log n = O(n^{-1/2})$
- g. $\log n = O(1/n)$
- h. $\log(n + 3) = \Theta(\sqrt{n})$
- i. $n + \sqrt{n} = \Omega(n^2 - n)$

2) How much time does the following “algorithm” require as a function of n ?

```
l ← 0
for i ← 1 to n do
  for j ← 1 to n2 do
    for k ← 1 to n3 do
      l ← l + 1
```

Express your answer in Θ notation in the simplest possible form. You may consider that each individual instruction (including loop control) is elementary.

3) How much time does the following “algorithm” require as a function of n ?

```
l ← 0
for i ← 1 to n do
  for j ← 1 to i do
    for k ← j to n do
      l ← l + 1
```

Express your answer in Θ notation in the simplest possible form. You may consider that each individual instruction (including loop control) is elementary.