1. (a) State formally what is meant by:

$f(n)$ is $\theta(g(n))$ [3 marks]

(b) Determine whether each of the following statements is true or false, justifying your answers:

i. $100n^3$ is $O(n^3)$
ii. $n \log(n)$ is $\Omega(n)$
iii. n^2 is $\theta(n^2 + n)$ [6 marks]

(c) The following algorithm computes the determinant of a matrix of size 3. How many basic operations will be required to complete the calculation? State clearly any assumptions you make.

```
Algorithm determinant(X)
// Input array X of size 3
// Output an integer d which is the determinant of X

d ← 0
for i ← 0 to 2 do
        d ← d + X[i,0] * (X[i+1 % 2, 1] * X[i+2 % 2, 2] –
                X[i+2 % 2, 1] * X[i+1 % 2, 2] )
return d
```

[4 marks]