

True/False

4. False

A function's *signature* is an interface of a function (name, parameter(s) and return value(s)).

5. False

There is a convention for a well-designed function to present all the side effects in its specification (described in postconditions)

6. True

$\Theta(n)$ algorithms works faster than $\Theta(n^2)$ algorithm.

9. False

big-O notation gives only upper bound, whereas the Θ -notation gives both lower and upper bounds.

10. True (see the explanation in 9.)

Multiple Choice

1. b)

see the definition of the signature of a function at the end of the book (page 560)

2. b), c)

3. d)

4. a)

5. d)

6. c)

Solution:

$n = 1,000,000$ and, $T(n) \approx 3$ seconds, where $T(n)$ is $\Theta(n^2)$.

Therefore, roughly, $bn^2 < T(1,000,000) < an^2$ or

$$b \cdot 1,000,000,000,000 < 3 < a \cdot 1,000,000,000,000$$

If we multiply all sides by 4, we will get:

$$b \cdot 4,000,000,000,000 < 12 < a \cdot 4,000,000,000,000 \quad \text{or}$$

$$b \cdot (2,000,000)^2 < 12 < a \cdot (2,000,000)^2$$

which is an approximate running time of the same algorithm with 2,000,000 elements as input.

10. c)

Solution:

2,000,000 (input) \rightarrow 4,000,000,000,000 (operations performed in algorithm)

4,000,000,000,000 (operations) \div 1,000,000,000 (operations per second) = 4,000 (seconds)