Started on	Wednesday, 15 February 2023, 08:18
State	Finished
Completed on	Wednesday, 15 February 2023, 08:48
Time taken	29 mins 43 secs
Marks	4.30/6.00
Grade	7.16 out of 10.00 (72%)

Question 1

Partially correct

Mark 0.33 out of 1.00

Select all correct estimates for $f(N) = 2N^2 \cdot \log_2 N + 8N^2$.

Select one or more:

- [ ] a. $f \in O(N)$ for $N \geq 1$.
- [x] b. $f \in O(N \cdot \log_2 N)$ for $N \geq 1$. ✗
- [ ] c. $f \in O(N^2)$ for $N \geq 1$.
- [x] d. $f \in O(N^2 \cdot \log_2 N)$ for $N \geq 2$. ✓
- [ ] e. $f \in O(N^3)$ for $N \geq 1$.
- [ ] f. $f \in O((N-1) \cdot (N-1) \cdot \log_2 N)$ for $N \geq 2$.

Your answer is partially correct.

You have correctly selected 1.

The correct answers are: $f \in O(N^2 \cdot \log_2 N)$ for $N \geq 2$., $f \in O(N^3)$ for $N \geq 1$., $f \in O((N-1) \cdot (N-1) \cdot \log_2 N)$ for $N \geq 2$.

Question 2

Partially correct

Mark 0.71 out of 1.00

Give the tilde approximations for the following quantities:

$n^{100}/2^n$	~(n^{100}+1)/2^n	✓
$(1+1/n)(1+2/n)$	~2n^3	✗
$2n^3 - 15n^2 + n$	~2n^3	✓
$1 + 1/n$	~1	✓
$n + 1$	~n	✓
$\lg(n^2 + 1)/\lg n$	~2	✓
$\lg(2n)/\lg n$	~\log(n)	✗

Your answer is partially correct.

You have correctly selected 5.

The correct answer is: $n^{100}/2^n \rightarrow$ ~(n^{100}+1)/2^n, $(1+1/n)(1+2/n) \rightarrow$ ~1, $2n^3 - 15n^2 + n \rightarrow$ ~2n^3, $1 + 1/n \rightarrow$ ~1, $n + 1 \rightarrow$ ~n, $\lg(n^2 + 1)/\lg n \rightarrow$ ~2, $\lg(2n)/\lg n \rightarrow$ ~1

Question 3

Correct

Mark 1.00 out of 1.00

Let $n > 1$. Give the tightest, correct estimate for the order of growth (as a function of n) of the running time of the following code fragment:

```
// java
int sum = 0;
for (int i = n; i > 0; i--)
   for (int j = 0; j < n; j++)
      sum++;
```

```
# python
sum = 0
i = n
while i > 0:
    j = 0
    while j < n:
        sum += 1
        j += 1
    i -= 1
```

Select one:

- $O(\log_2 n)$
- $O(n^3)$
- $O(n)$
- $O(n \cdot \log_2 n)$
- $O(1)$
- $O(n^2)$ ✓

Your answer is correct.

The correct answer is: $O(n^2)$

Question 4

Partially correct

Mark 0.25 out of 1.00

Let $n > 2$. Select all correct estimates for the order of growth (as a function of n) of the running time of the following code fragment:

```
// java
int sum = 0;
for (int k = n; k > 0; k /= 2)
   for (int i = 0; i < k; i++)
      sum++;
```

```
# python
sum = 0
k = n
while k > 0:
    i = 0
    while i < k:
        sum += 1
        i += 1
    k //= 2
```

Select one or more:

- [x] $O(n \cdot \log_2 n)$ ✓
- [ ] $O(1)$
- [ ] $O(n^3)$
- [ ] $O(\log_2 n)$
- [ ] $O(n)$
- [ ] $O(n^2)$

Your answer is partially correct.

You have correctly selected 1.

The correct answers are: $O(n)$, $O(n \cdot \log_2 n)$, $O(n^2)$, $O(n^3)$

Question 5

Correct

Mark 1.00 out of 1.00

Let $n > 1$. Give the tightest, correct estimate for the order of growth (as a function of n) of the running time of the following code fragment:

```
// java
int sum = 0;
for (int i = 1; i < n; i *= 2)
   for (int j = 0; j < i; j++)
      sum++;
```

```
# python
sum = 0
i = 1
while i < n:
    j = 0
    while j < i:
        sum += 1
        j += 1
    i *= 2
```

Select one:

- $O(\log_2 n)$
- $O(n^2)$
- $O(n^3)$
- $O(1)$
- $O(n)$ ✓
- $O(n \cdot \log_2 n)$

Your answer is correct.

The correct answer is: $O(n)$

Question 6

Correct

Mark 1.00 out of 1.00

Let $n > 1$. Give the tightest, correct estimate for the order of growth (as a function of n) of the running time of the following code fragment:

```
int sum = 0;
for (int i = 1; i < n; i *= 2)
   for (int j = 0; j < n; j++)
      sum++;
```

```
sum = 0
i = 1
while i < n:
    j = 0
    while j < n:
        sum += 1
        j += 1
    i *= 2
```

Select one:

- $O(1)$
- $O(n^3)$
- $O(n^2)$
- $O(n \cdot \log_2 n)$ ✓
- $O(n)$
- $O(\log_2 n)$

Your answer is correct.

The correct answer is: $O(n \cdot \log_2 n)$