3. Given the following program in C:

int factorial (int n) {

<-----------------------------1

if (n <= 1) return 1;

else return (n \* factorial(n - 1));

<-----------------------------2

}

void main() {

int value;

value = factorial(4);

<-----------------------------3

}

a. Design proper activation record instances for factorial and main for the third call at **position 2**.

b. Illustrate the final ARI for main at **position 3.**

First

| Functional Value | ? |
| --- | --- |
| Parameter | 4 |
| Dynamic Link | -----------> |
| Return Address | Return to main |
| Return Address (Local) | <----------- |

Second

| Functional Value | ? |
| --- | --- |
| Parameter | 3 |
| Dynamic Link | -----------> (1) |
| Return Address | Factorial |
| Return Address | (none) |

| Functional Value | ? |
| --- | --- |
| Parameter | 4 |
| Dynamic Link | -----------> (2) |
| Return Address (main) | <----------- (1) |
| Return Address (Local) | <----------- (2) |

Third

| Functional Value | ? |
| --- | --- |
| Parameter | 2 |
| Dynamic Link | ----------->(1) |
| Return Address | Factorial |
| Return Address | None |

| Functional Value | ? |
| --- | --- |
| Parameter | 3 |
| Dynamic Link | ----------->(3) |
| Return Address | <-----------(1) |
| Return Address | None |

| Functional Value | ? |
| --- | --- |
| Parameter | 4 |
| Dynamic Link | ----------->(2) |
| Return Address | <-----------(3) |
| Return Address | <-----------(2) |

Fourth

| Functional Value | ? |
| --- | --- |
| Parameter | 1 |
| Dynamic Link | ----------->(1) |
| Return Address | Factorial |
| Return Address | None |

| Functional Value | ? |
| --- | --- |
| Parameter | 2 |
| Dynamic Link | ----------->(2) |
| Return Address | Factorial |
| Return Address | None |

| Functional Value | ? |
| --- | --- |
| Parameter | 3 |
| Dynamic Link | ----------->(3) |
| Return Address | <-----------(2) |
| Return Address | <-----------(1) |

| Functional Value | ? |
| --- | --- |
| Parameter | 4 |
| Dynamic Link | ----------->(4) |
| Return Address(main) | <-----------(3) |
| Return Address (local) | <-----------(4) |