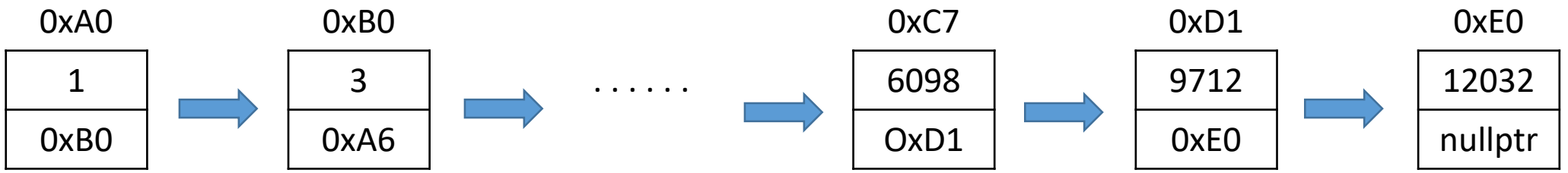
CSC215

Math and Computer Science

SOUTH DAKOTA
SCHOOL OF MINES
& TECHNOLOGY

Singly Linked List – Print Backwards?

How?



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Recursively

```
printBackwards( headptr );

void printBackwards( node *ptr )
{
    if( ptr == nullptr )
        return;

    printBackwards( ptr->next );
    cout << ptr->num << " ";
}
```

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Doubly Linked List

- Allows traversal in either direction.
- Requires another pointer in the structure.
- Requires a tail pointer for the last node in the list.

```
struct node
{
    int num;
    node *next;
    node *last;
};
```

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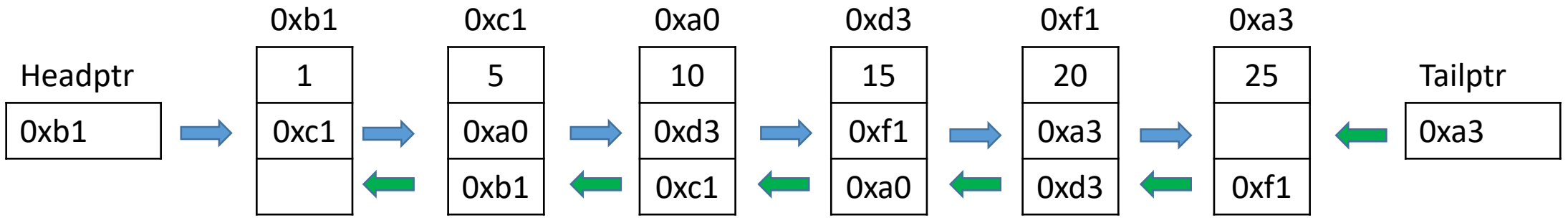
Traversal - Forward



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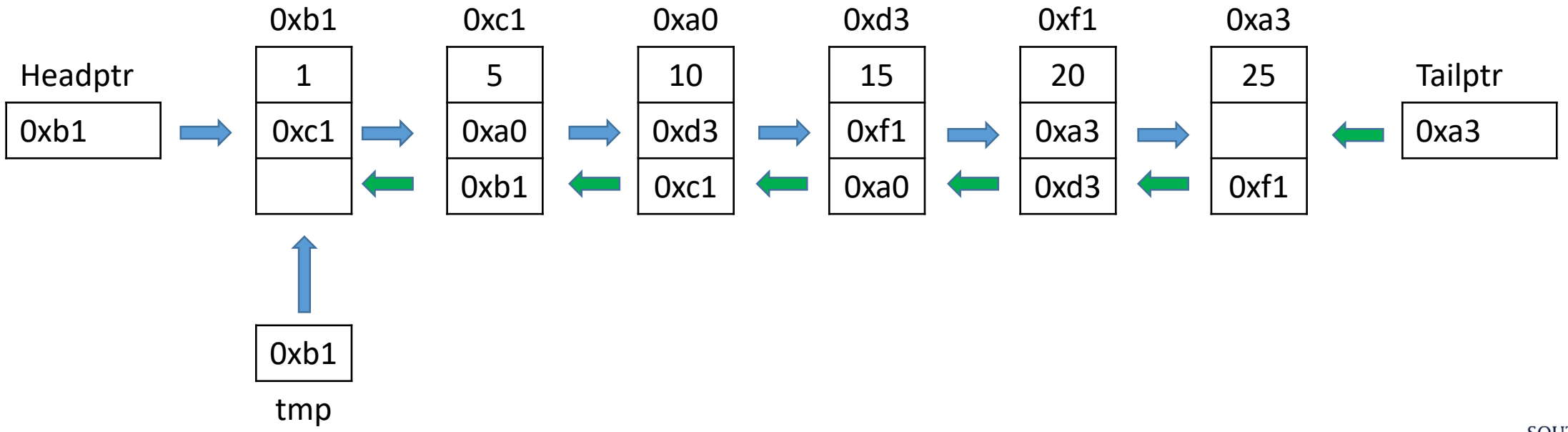
Traversal - Forward



Output: 1

Set temp to Headptr and while temp != nullptr, output item, move temp down using next pointer field

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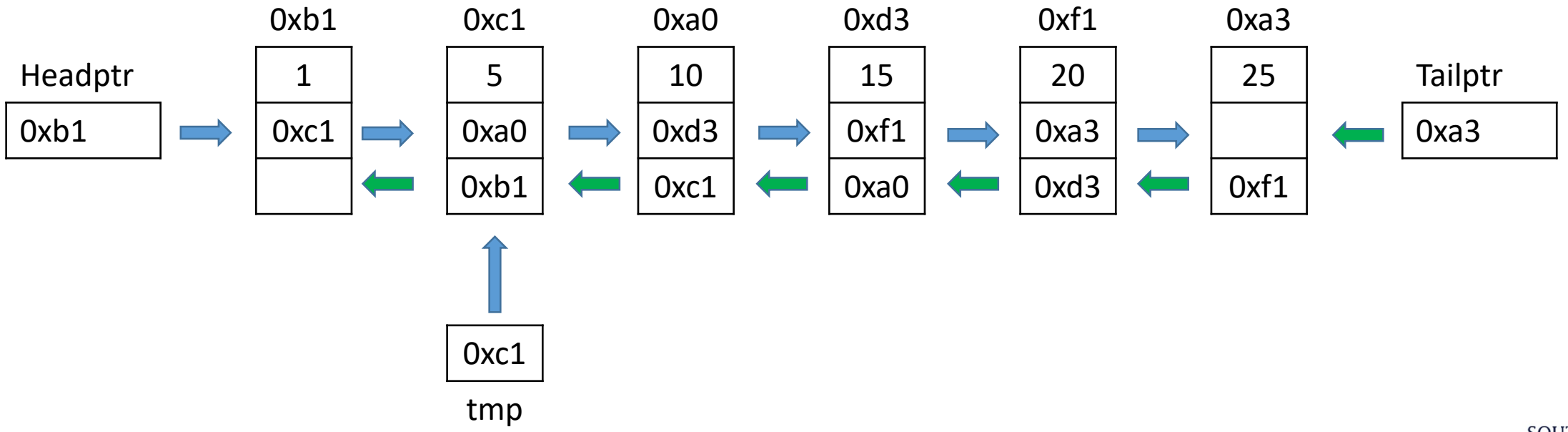
Traversal - Forward



Output: 1 5

While temp is not nullptr, output item and move down using next pointer.

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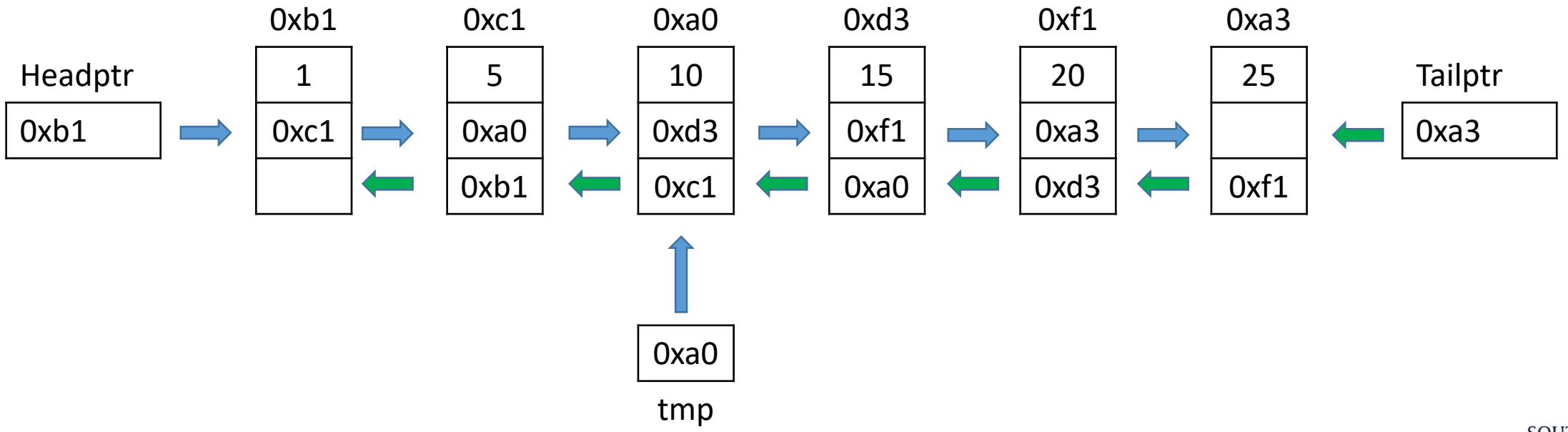
Traversal - Forward



Output: 1 5 10

While temp is not nullptr, output item and move down using next pointer.

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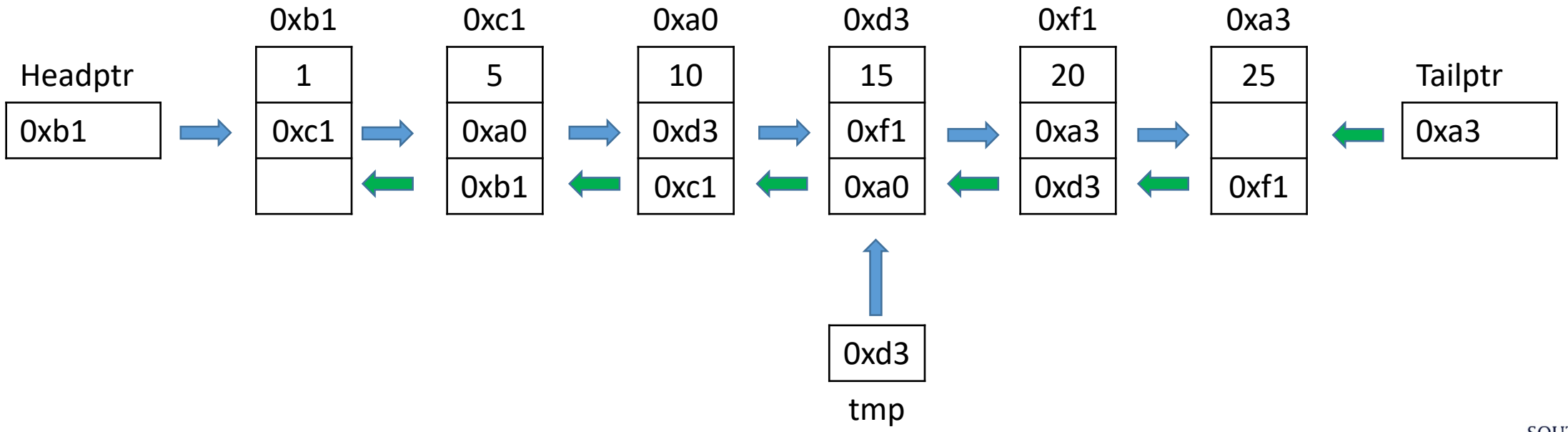
Traversal - Forward



Output: 1 5 10 15

While temp is not nullptr, output item and move down using next pointer.

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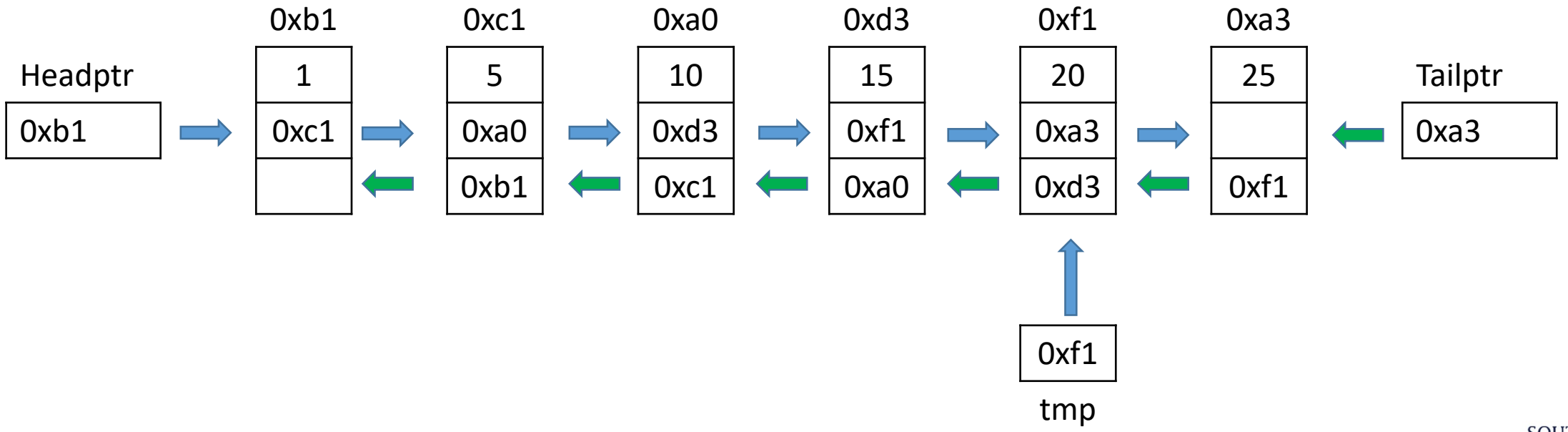
Traversal - Forward



Output: 1 5 10 15 20

While temp is not nullptr, output item and move down using next pointer.

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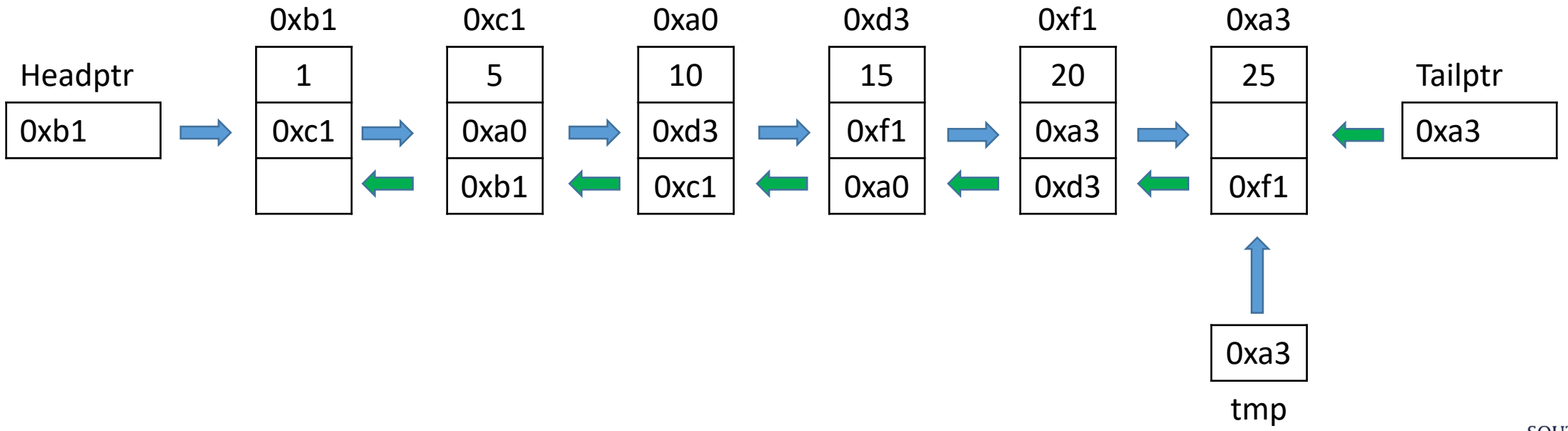
Traversal - Forward



Output: 1 5 10 15 20 25

While temp is not nullptr, output item and move down using next pointer.

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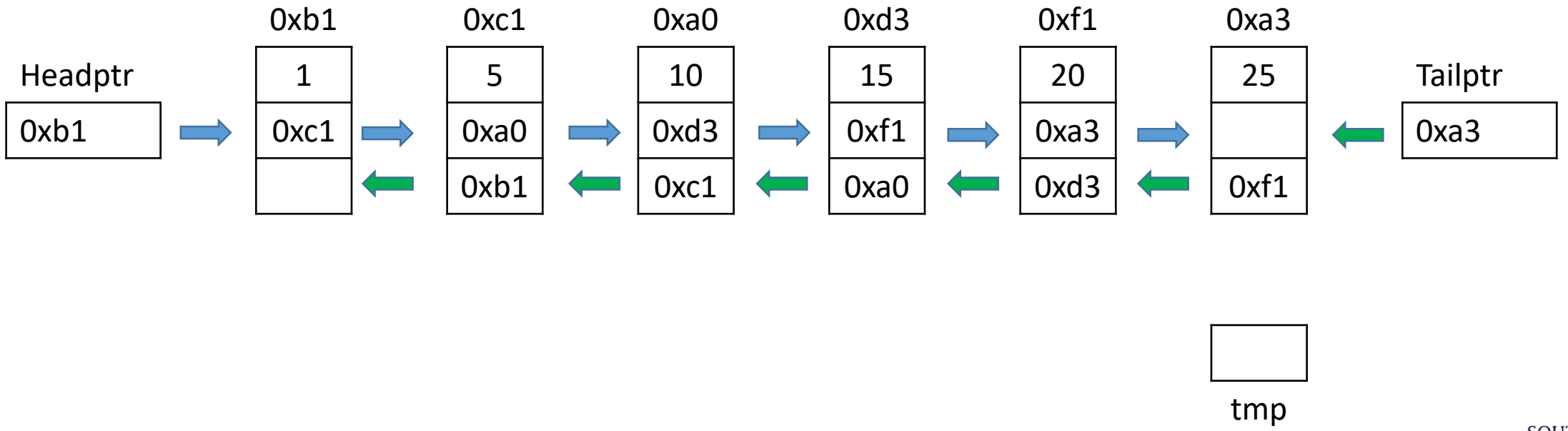
Traversal - Forward



Output: 1 5 10 15 20 25

temp is nullptr, done traversing the list forward.

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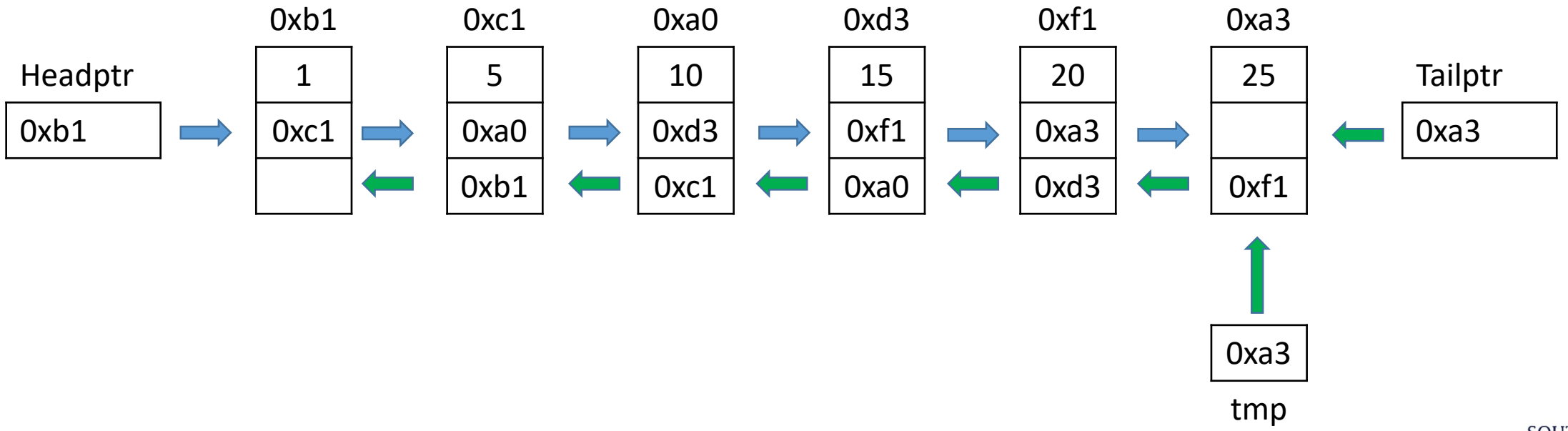
Traversal - Backwards



Output: 25

Set temp to tailptr, while temp is not nullptr, output item and move temp down using last pointer.

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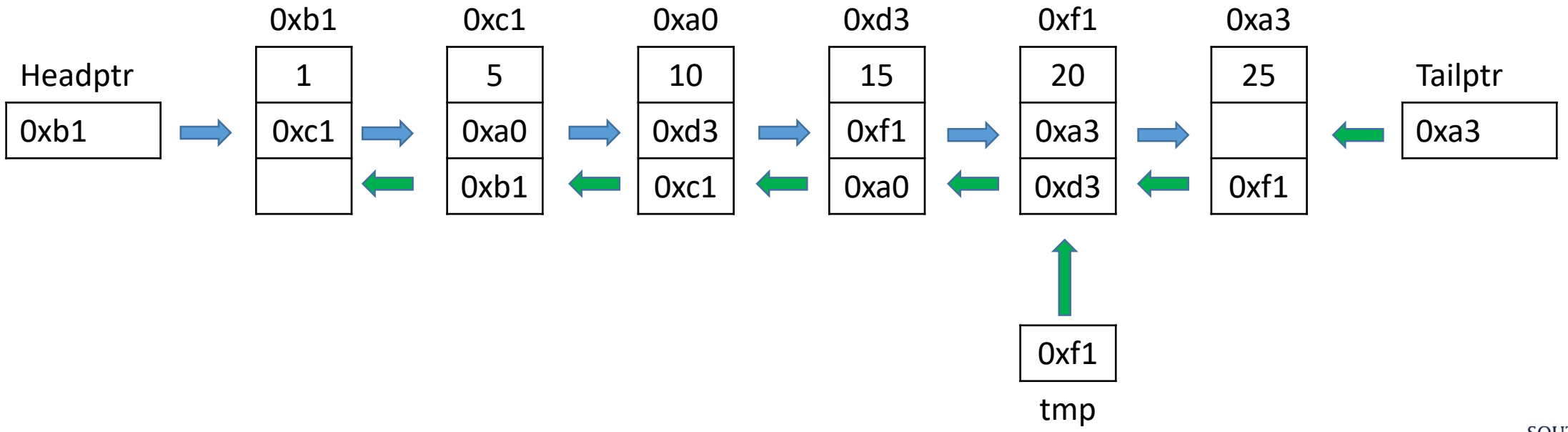
Traversal - Backwards



Output: 25 20

while temp is not nullptr, output item and move temp down using last pointer.

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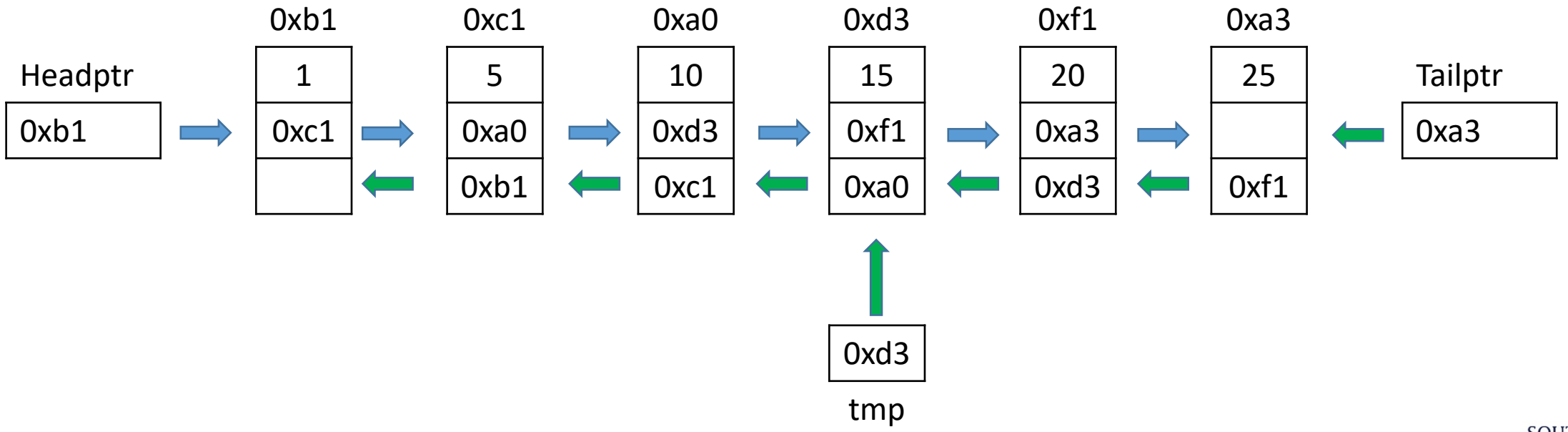
Traversal - Backwards



Output: 25 20 15

while temp is not nullptr, output item and move temp down using last pointer.

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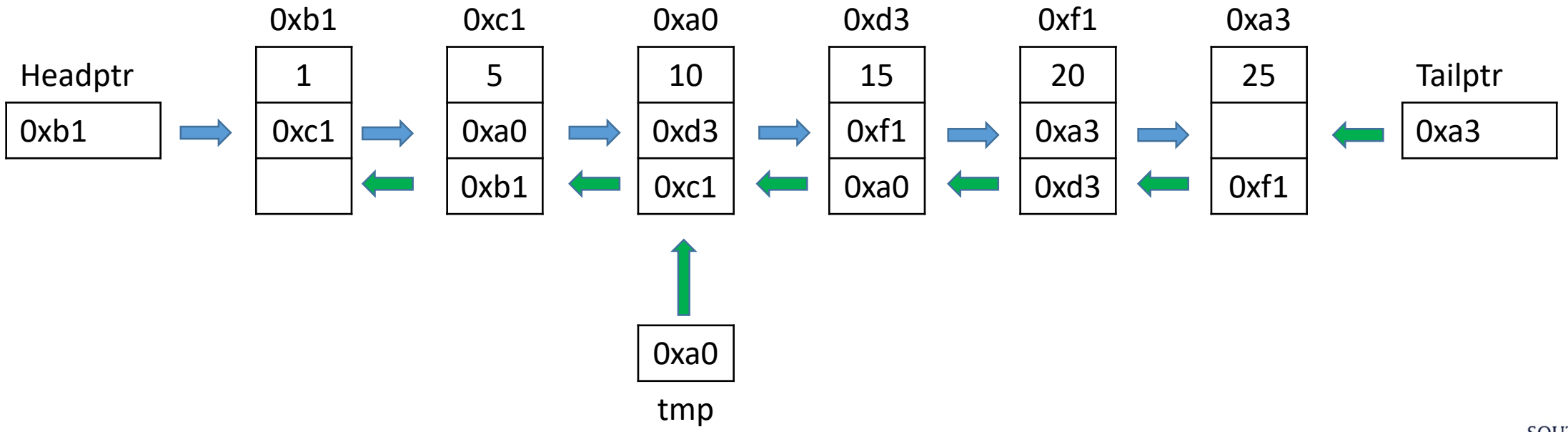
Traversal - Backwards



Output: 25 20 15 10

while temp is not nullptr, output item and move temp down using last pointer.

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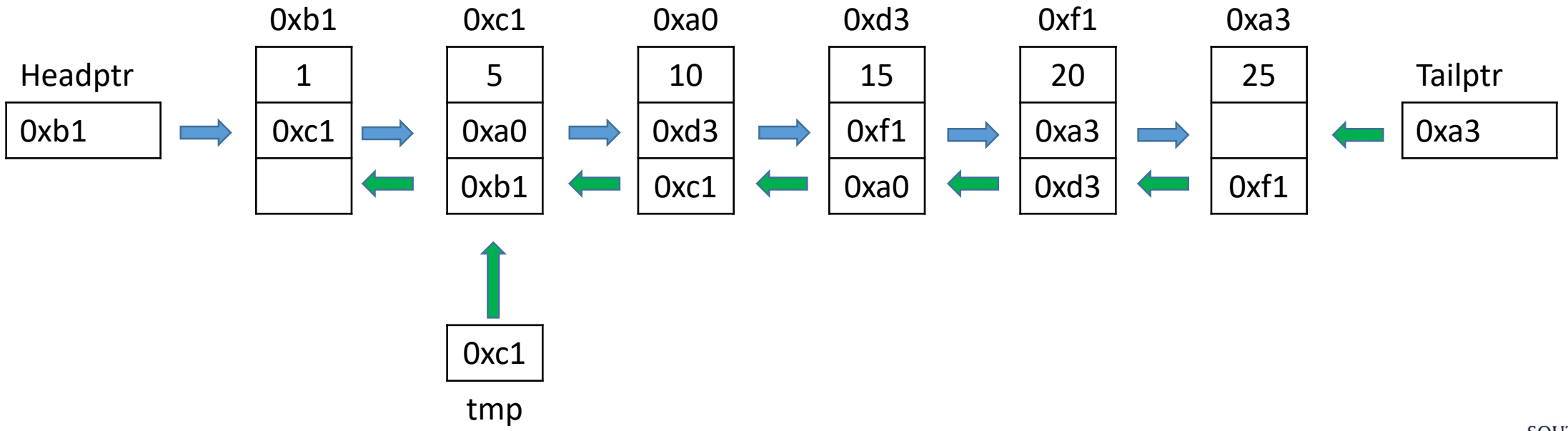
Traversal - Backwards



Output: 25 20 15 10 5

while temp is not nullptr, output item and move temp down using last pointer.

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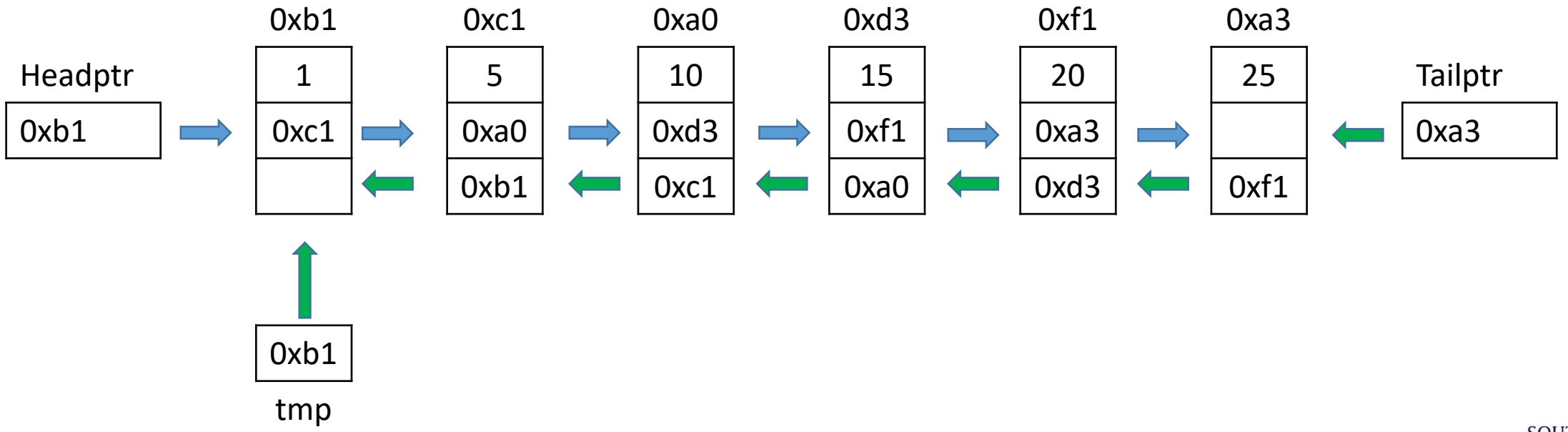
Traversal - Backwards

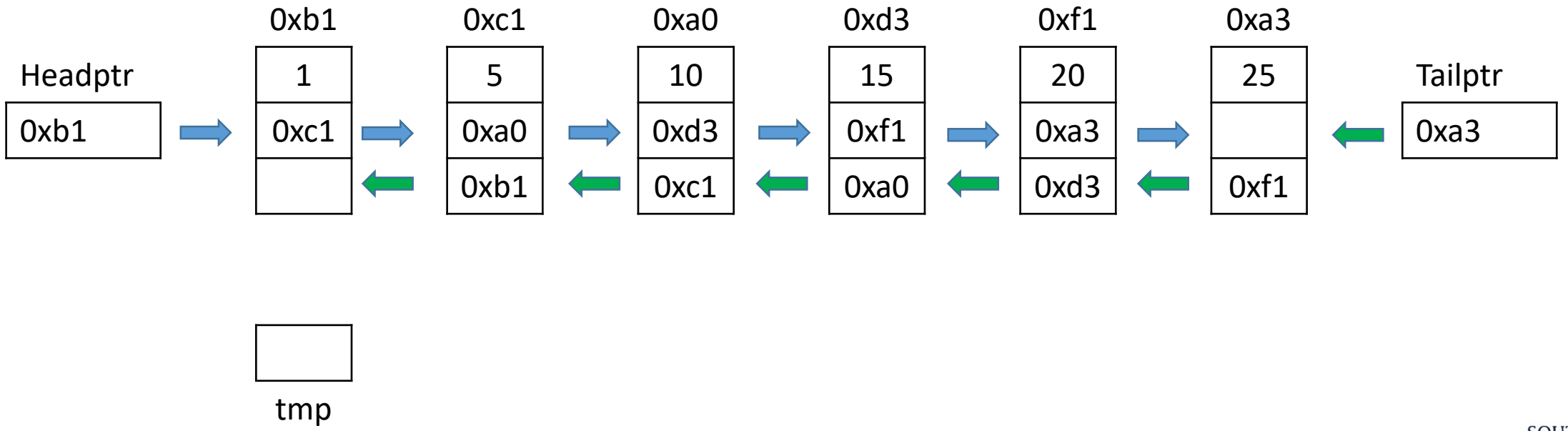


Output: 25 20 15 10 5 1

while temp is not nullptr, output item and move temp down using last pointer.

SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY

Traversal - Backwards



Output: 25 20 15 10 5 1

Temp is nullptr, quit traversing.

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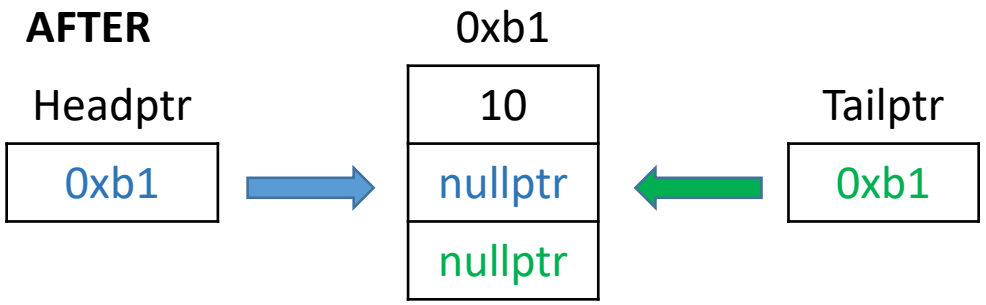
Insertion

1. Empty
2. Front
3. Middle
4. End

Insert - Empty (10)

BEFORE

AFTER



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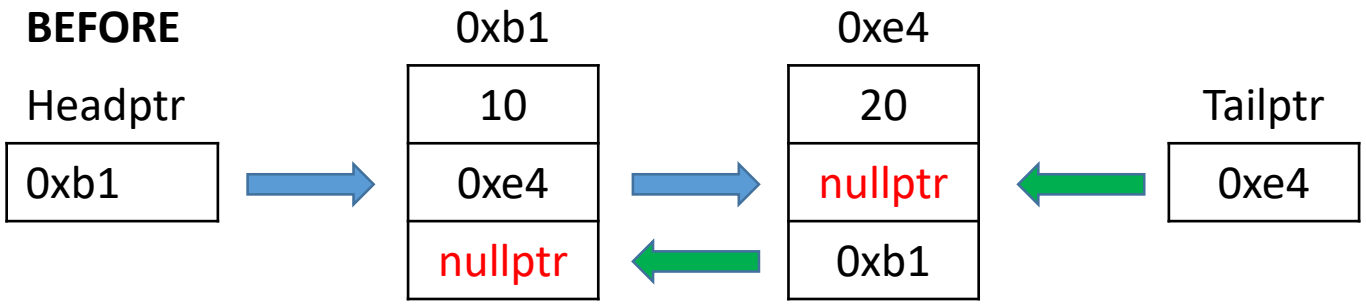
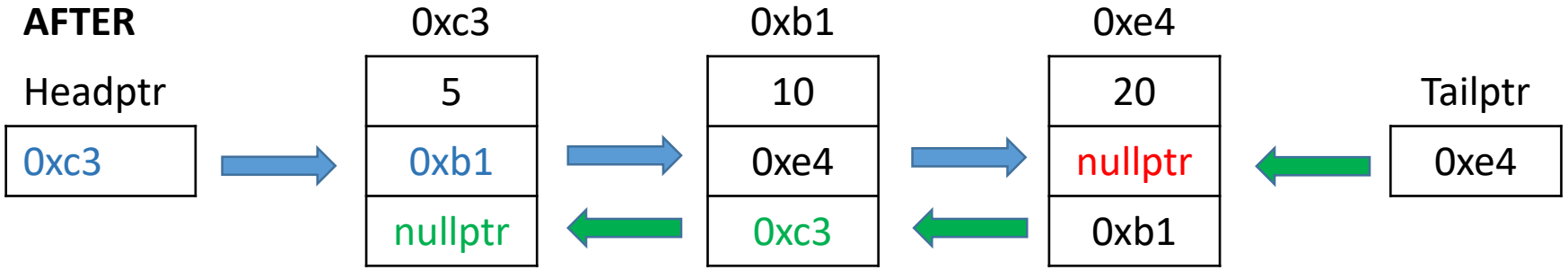
Insert - Front (5)

Assume 10 and 20 in list for clarity





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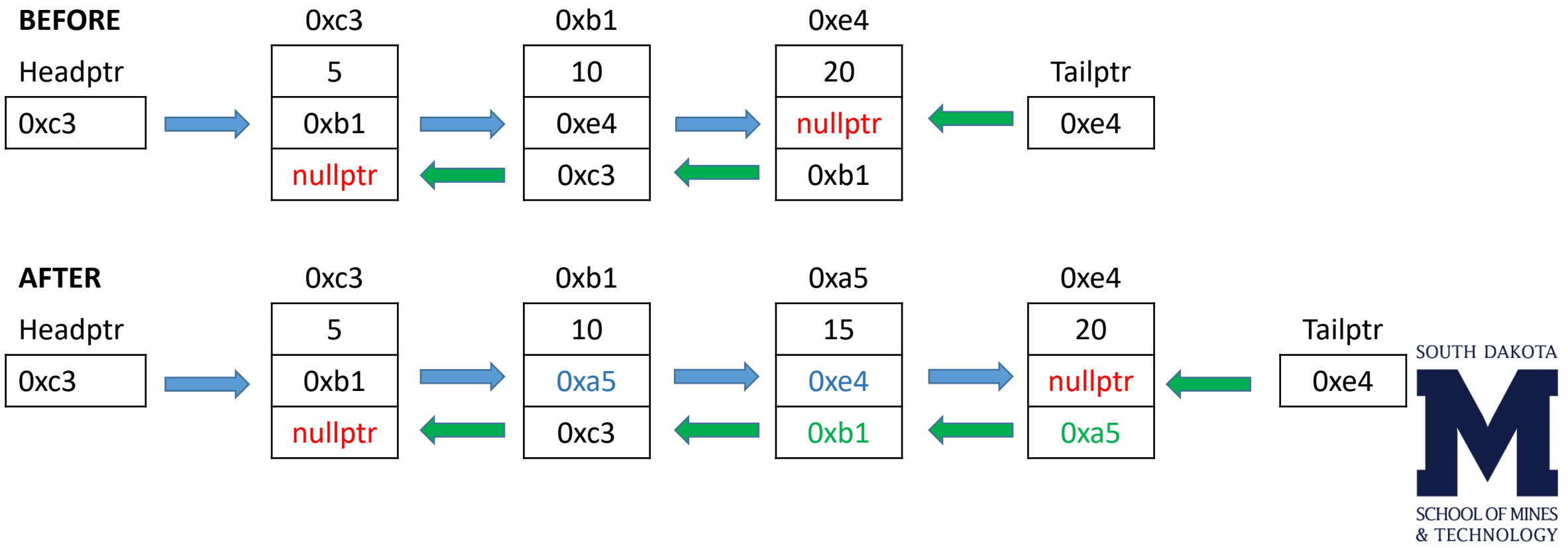
Insert - Middle (15)



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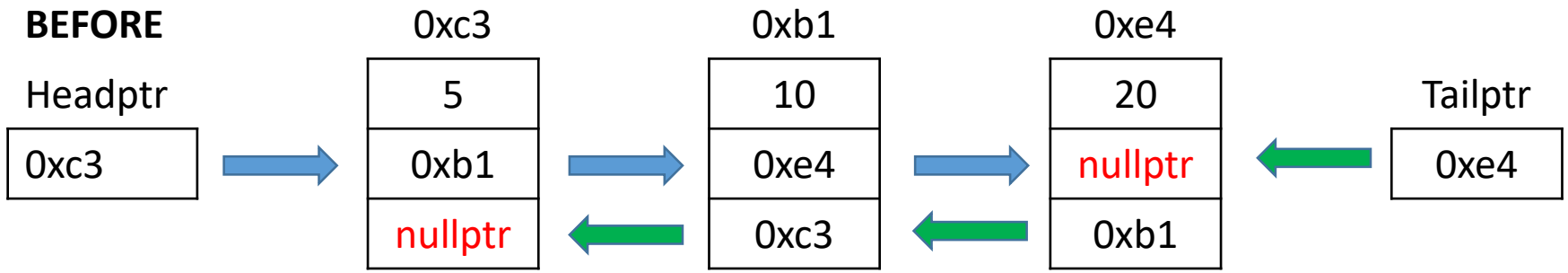
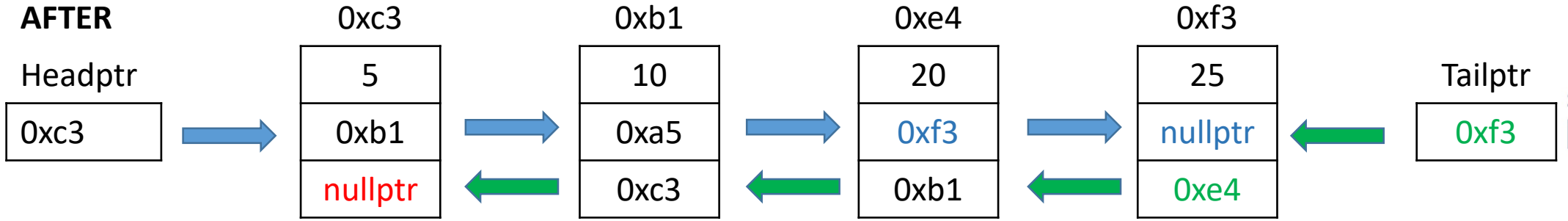
Insert - End (25)

Assume list has 5, 10, 20 for clarity





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Removal

1. Empty
2. Front
3. Middle
4. End
5. Last node in list

Remove - Empty

BEFORE

Headptr

nullptr

Tailptr

nullptr

AFTER Should just return false

Headptr

nullptr

Tailptr

nullptr

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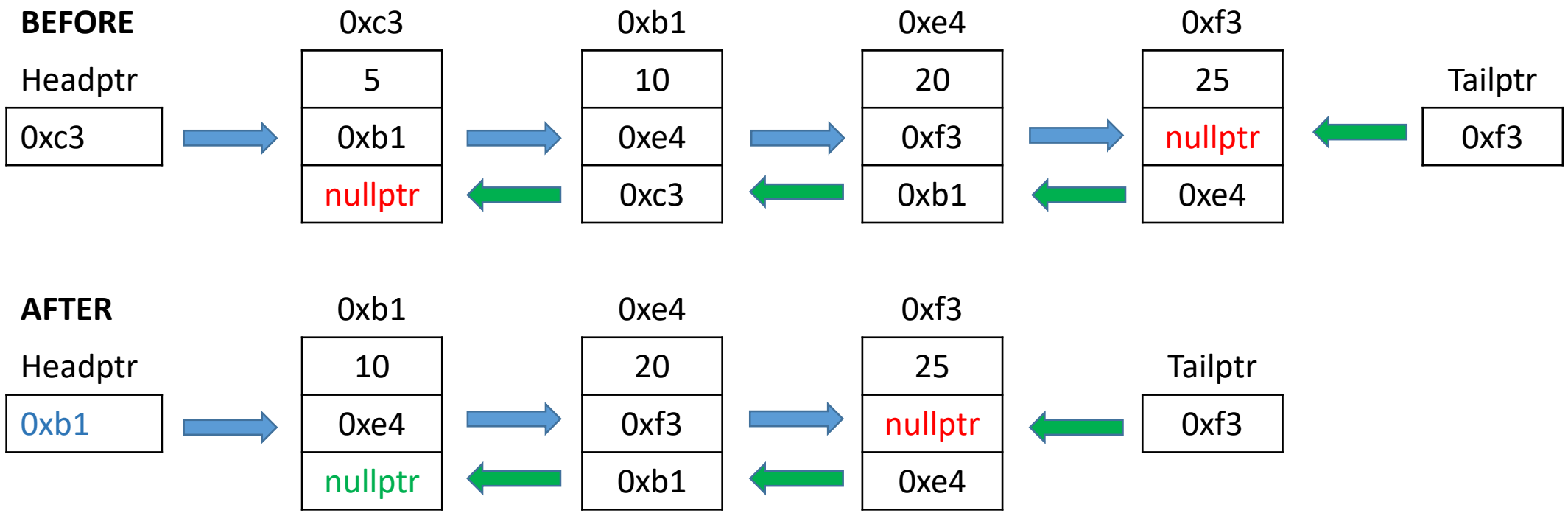
Remove - Front (5)



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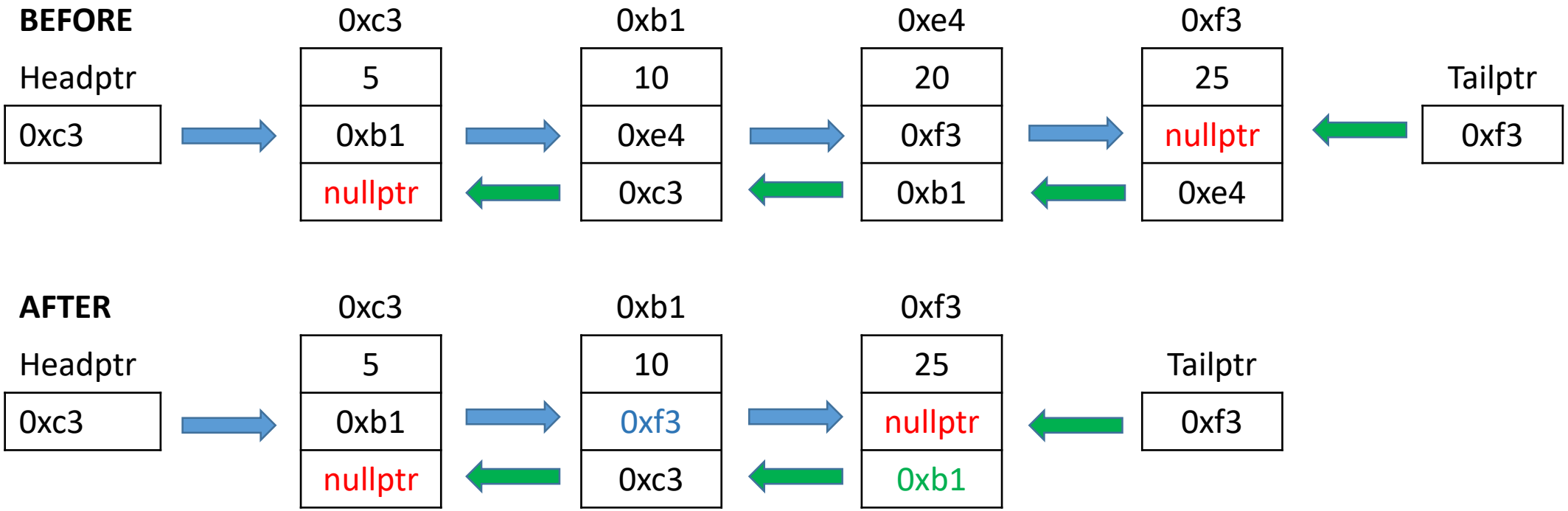
Remove - Middle (20)

Assume list has 5, 10, 20 and 25 for clarity



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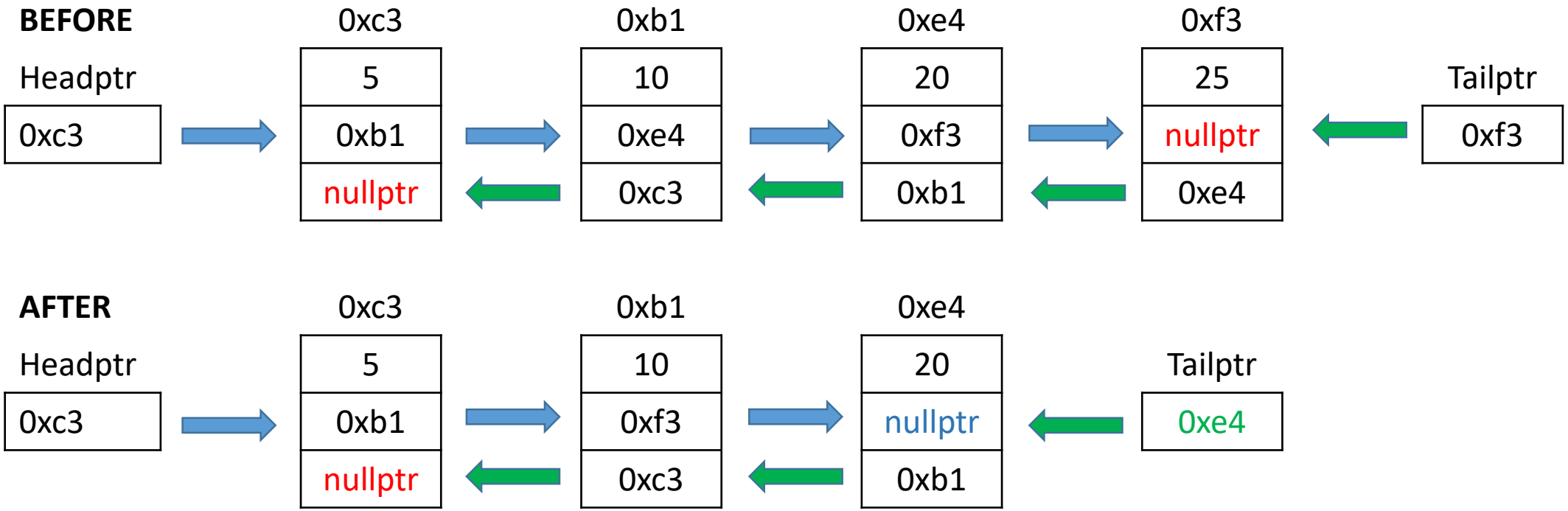
Remove - End (25)

Assume list has 5, 10, 20 and 25 for clarity



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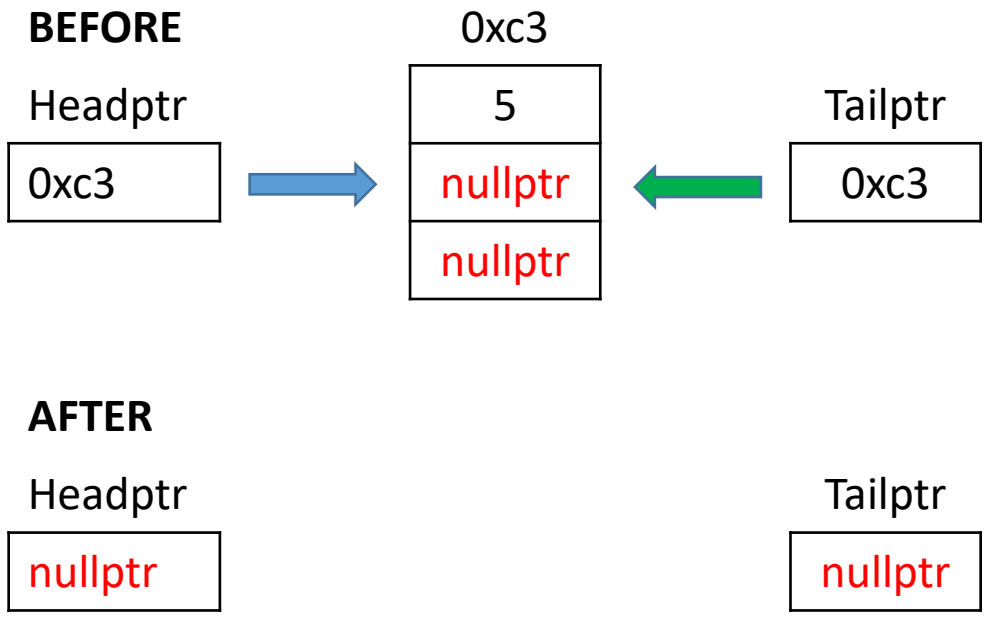
Remove – Last Node in List (5)



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