

Exercise 1

Use a box-and-arrow diagram for the following program to explain what it prints out:

```
#include <stdio.h>

int foo(int *bar, int **baz) {
    *bar = 5;
    *(bar+1) = 6;
    *baz = bar+2;
    return *((*baz)+1);
}

int main(int argc, char **argv) {
    int arr[4] = {1, 2, 3, 4};
    int *ptr;

    arr[0] = foo(&(arr[0]), &ptr);
    printf("%d %d %d %d %d\n",
           arr[0], arr[1], arr[2], arr[3], *ptr);
    return 0;
}
```

main

```
#include <stdio.h>

int foo(int *bar, int **baz) {
    *bar = 5;
    *(bar+1) = 6;
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    return *((*baz)+1);
}

→ int main(int argc, char **argv) {
    int arr[4] = {1, 2, 3, 4};
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    arr[0] = foo(&(arr[0]), &ptr);
    printf("%d %d %d %d %d\n",
           arr[0], arr[1], arr[2], arr[3], *ptr);
    return 0;
}
```

| | |
|-----|-----|
| ptr | ??? |
|-----|-----|

| | |
|--------|-----|
| arr[0] | ??? |
|--------|-----|

| | |
|--------|-----|
| arr[1] | ??? |
|--------|-----|

| | |
|--------|-----|
| arr[2] | ??? |
|--------|-----|

| | |
|--------|-----|
| arr[3] | ??? |
|--------|-----|

main

```
#include <stdio.h>

int foo(int *bar, int **baz) {
    *bar = 5;
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    printf("%d %d %d %d %d\n",
           arr[0], arr[1], arr[2], arr[3], *ptr);
    return 0;
}
```

| | |
|--------|-----|
| ptr | ??? |
| arr[0] | 1 |
| arr[1] | 2 |
| arr[2] | 3 |
| arr[3] | 4 |

main

```
#include <stdio.h>

int foo(int *bar, int **baz) {
    *bar = 5;
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int main(int argc, char **argv) {
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           arr[0], arr[1], arr[2], arr[3], *ptr);
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```



| | |
|-----|-----|
| ptr | ??? |
|-----|-----|

| | |
|--------|---|
| arr[0] | 1 |
|--------|---|

| | |
|--------|---|
| arr[1] | 2 |
|--------|---|

| | |
|--------|---|
| arr[2] | 3 |
|--------|---|

| | |
|--------|---|
| arr[3] | 4 |
|--------|---|

main

```
#include <stdio.h>

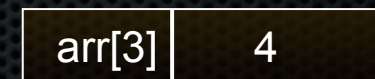
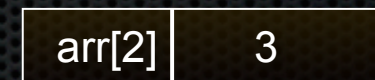
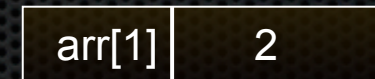
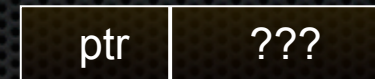
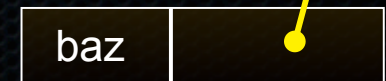
int foo(int *bar, int **baz) {
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    return *((*baz)+1);
}

int main(int argc, char **argv) {
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    return 0;
}
```



foo



main

```
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```

| | |
|-----|-----|
| ptr | ??? |
|-----|-----|

| | |
|--------|---|
| arr[0] | 5 |
|--------|---|

| | |
|--------|---|
| arr[1] | 2 |
|--------|---|

| | |
|--------|---|
| arr[2] | 3 |
|--------|---|

| | |
|--------|---|
| arr[3] | 4 |
|--------|---|

| | |
|-----|--|
| bar | |
|-----|--|

| | |
|-----|--|
| baz | |
|-----|--|

foo

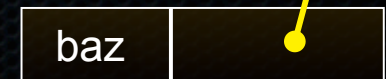
main

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}
```



foo

main

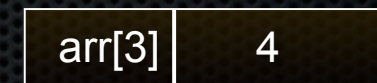
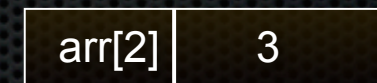
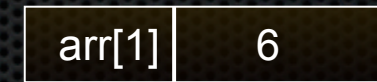
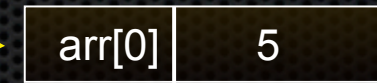
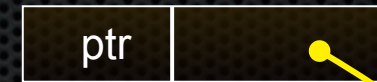
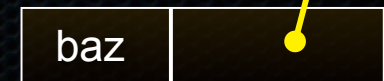
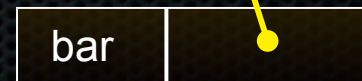
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           arr[0], arr[1], arr[2], arr[3], *ptr);
    return 0;
}
```

foo



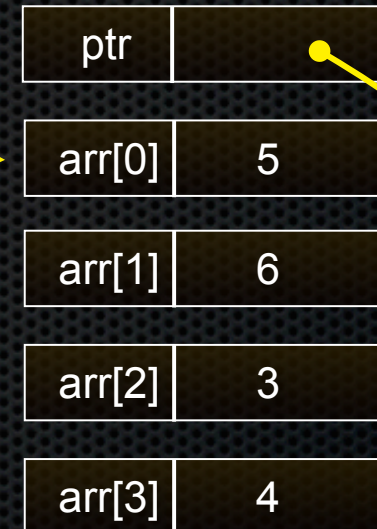
main

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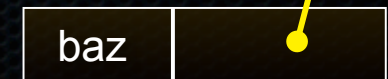
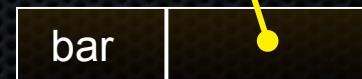
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    int *ptr;

    arr[0] = foo(&(arr[0]), &ptr);
    printf("%d %d %d %d %d\n",
           arr[0], arr[1], arr[2], arr[3], *ptr);
    return 0;
}
```



**baz = pointer to arr[2]*

foo



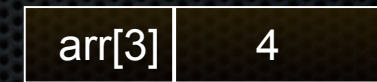
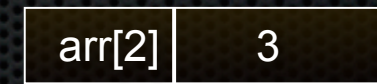
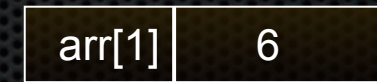
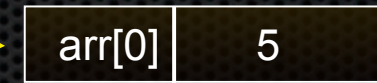
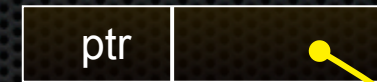
main

```
#include <stdio.h>

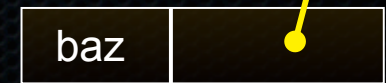
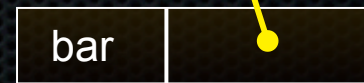
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int main(int argc, char **argv) {
    int arr[4] = {1, 2, 3, 4};
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    arr[0] = foo(&(arr[0]), &ptr);
    printf("%d %d %d %d %d\n",
           arr[0], arr[1], arr[2], arr[3], *ptr);
    return 0;
}
```



*(*baz)+1 = pointer to arr[3]*



foo

main

```
#include <stdio.h>

int foo(int *bar, int **baz) {
    *bar = 5;
    *(bar+1) = 6;
    *baz = bar+2;
    return *((*baz)+1);
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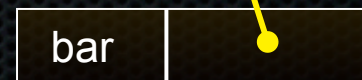
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           arr[0], arr[1], arr[2], arr[3], *ptr);
    return 0;
}
```



$*((*baz)+1) = 4$

foo



main

```
#include <stdio.h>

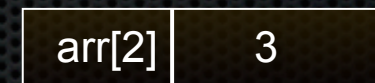
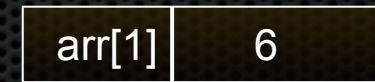
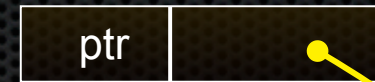
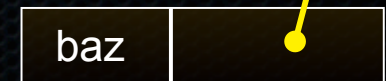
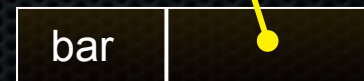
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foo



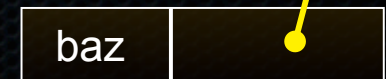
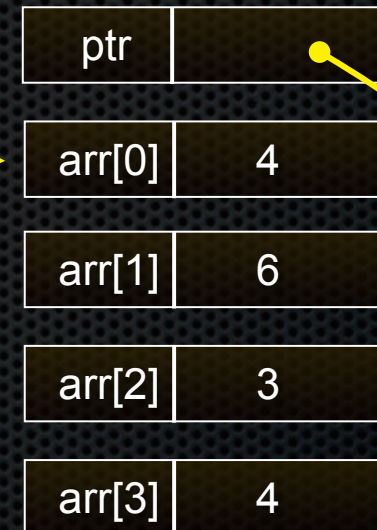
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foo

prints: 4 6 3 4 3