```c
// Implements a list of unique numbers of fixed length

#include <cs50.h>
#include <stdio.h>

int main(void)
{
    // Prompt for number of numbers
    int capacity;
    do
    {
        capacity = get_int("capacity: ");
    }
    while (capacity < 1);

    // memory for numbers
    int numbers[capacity];

    // Prompt for numbers
    int size = 0;
    while (size < capacity)
    {
        // Prompt for number
        int number = get_int("number: ");

        // Check whether number is already in list
        bool found = false;
        for (int i = 0; i < size; i++)
        {
            if (numbers[i] == number)
            {
                found = true;
                break;
            }
        }

        // If number not found in list, add to list
        if (!found)
        {
            numbers[size] = number;
            size++;
        }
    }

    // Print numbers
```

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    for (int i = 0; i < size; i++)
    {
        printf("%i\n", numbers[i]);
    }
}
```

```c
// Implements a list of unique numbers of dynamic length

#include <cs50.h>
#include <stdio.h>

int main(void)
{
    // memory for numbers
    int *numbers = NULL;
    int capacity = 0;

    // Prompt for numbers (until EOF)
    int size = 0;
    while (true)
    {
        // Prompt for number
        int number = get_int("number: ");

        // Check for EOF
        if (number == INT_MAX)
        {
            break;
        }

        // Check whether number is already in list
        bool found = false;
        for (int i = 0; i < size; i++)
        {
            if (numbers[i] == number)
            {
                found = true;
                break;
            }
        }

        // If number not found in list, add to list
        if (!found)
        {
            // Check whether enough space for number
            if (size == capacity)
            {
                // Allocate space for number
                numbers = realloc(numbers, sizeof(int) * (size + 1));
                if (!numbers)
                {
```

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                    return 1;
                }
                capacity++;
            }

            // Add number to list
            numbers[size] = number;
            size++;
        }
    }

    // Print numbers
    printf("\n");
    for (int i = 0; i < size; i++)
    {
        printf("%i\n", numbers[i]);
    }

    // Free memory
    if (numbers)
    {
        free(numbers);
    }
}
```

```c
// Implements a list of unique numbers of dynamic length

#include <cs50.h>
#include <stdio.h>

typedef struct node
{
    int number;
    struct node *next;
}
node;

int main(void)
{
    // memory for numbers
    node *numbers = NULL;

    // Prompt for numbers (until EOF)
    while (true)
    {
        // Prompt for number
        int number = get_int("number: ");

        // Check for EOF
        if (number == INT_MAX)
        {
            break;
        }

        // Check whether number is already in list
        bool found = false;
        for (node *ptr = numbers; ptr != NULL; ptr = ptr->next)
        {
            if (ptr->number == number)
            {
                found = true;
                break;
            }
        }

        // If number not found in list, add to list
        if (!found)
        {
            // Allocate space for number
            node *n = malloc(sizeof(node));
```

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            if (!n)
            {
                return 1;
            }

            // Add number to list
            n->number = number;
            n->next = NULL;
            if (numbers)
            {
                for (node *ptr = numbers; ptr != NULL; ptr = ptr->next)
                {
                    if (!ptr->next)
                    {
                        ptr->next = n;
                        break;
                    }
                }
            }
            else
            {
                numbers = n;
            }
        }
    }

    // Print numbers
    printf("\n");
    for (node *ptr = numbers; ptr != NULL; ptr = ptr->next)
    {
        printf("%i\n", ptr->number);
    }

    // Free memory
    node *ptr = numbers;
    while (ptr != NULL)
    {
        node *next = ptr->next;
        free(ptr);
        ptr = next;
    }
}
```

```c
// http://valgrind.org/docs/manual/quick-start.html#quick-start.prepare

#include <stdlib.h>

void f(void)
{
    int *x = malloc(10 * sizeof(int));
    x[10] = 0;
}

int main(void)
{
    f();
    return 0;
}
```

```c
// Fails to swap two integers

#include <stdio.h>

void swap(int a, int b);

int main(void)
{
    int x = 1;
    int y = 2;

    printf("x is %i, y is %i\n", x, y);
    swap(x, y);
    printf("x is %i, y is %i\n", x, y);
}

void swap(int a, int b)
{
    int tmp = a;
    a = b;
    b = tmp;
}
```

```c
// Gets an int from user using scanf

#include <stdio.h>

int main(void)
{
    int x;
    printf("x: ");
    scanf("%i", &x);
    printf("x: %i\n", x);
}
```

```c
// Incorrectly gets a string from user using scanf

#include <stdio.h>

int main(void)
{
    char *s;
    printf("s: ");
    scanf("%s", s);
    printf("s: %s\n", s);
}
```

```c
// Dangerously gets a string from user using scanf

#include <stdio.h>

int main(void)
{
    char s[5];
    printf("s: ");
    scanf("%s", s);
    printf("s: %s\n", s);
}
```

```c
// Demonstrates structs

#include <cs50.h>
#include <stdio.h>
#include <string.h>

#include "struct.h"

int main(void)
{
    // allocate space for students
    int enrollment = get_int("enrollment: ");
    student students[enrollment];

    // prompt for students' names and dorms
    for (int i = 0; i < enrollment; i++)
    {
        students[i].name = get_string("name: ");
        students[i].dorm = get_string("dorm: ");
    }

    // print students' names and dorms
    for (int i = 0; i < enrollment; i++)
    {
        printf("%s is in %s.\n", students[i].name, students[i].dorm);
    }
}
```

```c
// Demonstrates file I/O

#include <cs50.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

#include "structs.h"

int main(void)
{
    // allocate memory for students
    int enrollment = get_int("enrollment: ");
    student students[enrollment];

    // prompt for students' names and dorms
    for (int i = 0; i < enrollment; i++)
    {
        students[i].name = get_string("name: ");
        students[i].dorm = get_string("dorm: ");
    }

    // save students to disk
    FILE *file = fopen("students.csv", "w");
    if (file)
    {
        for (int i = 0; i < enrollment; i++)
        {
            fprintf(file, "%s,%s\n", students[i].name, students[i].dorm);
        }
        fclose(file);
    }
}
```

```c
// Swaps two integers using pointers

#include <stdio.h>

void swap(int *a, int *b);

int main(void)
{
    int x = 1;
    int y = 2;

    printf("x is %i, y is %i\n", x, y);
    swap(&x, &y);
    printf("x is %i, y is %i\n", x, y);
}

void swap(int *a, int *b)
{
    int tmp = *a;
    *a = *b;
    *b = tmp;
}
```