

1- Write a program that initializes a vector of integers with five elements, doubles the size of the vector, and then prints the elements.

اكتب برنامجًا يقوم بتهيئة vector من الأعداد الصحيحة بخمسة عناصر، ومضاعفة حجم vector ثم طباعة العناصر.

Output

```
Vector elements: 1 2 3 4 5 0 134481 0 0 0
```

Solution

```
// www.gammal.tech

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

int main() {
    int *vec, i;

    // Initialize vector with five elements
    vec = (int*)malloc(5 * sizeof(int));
    for (i = 0; i < 5; i++)
        vec[i] = i + 1;

    // Double the size of the vector
    vec = realloc(vec, 10 * sizeof(int));

    // Print the elements of the vector
    printf("Vector elements: ");
    for (i = 0; i < 10; i++)
        printf("%d ", vec[i]);
    printf("\n");

    // Free allocated memory
    free(vec);

    return 0;
}
```

2- Write a program that initializes a vector with three integers, adds a new integer at the end, and prints the updated vector.

اكتب برنامجًا يقوم بتهيئة vector بثلاثة أعداد صحيحة، وإضافة عدد صحيح جديد في النهاية، وطباعة vector المحدث.

Input

```
Enter a new integer: 10
```

Output

```
Updated vector: 1 2 3 10
```

Solution

```
// www.gammal.tech

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

int main() {
    int *vec, i, newElement;

    // Initialize vector with three elements
    vec = (int*)malloc(3 * sizeof(int));
    for (i = 0; i < 3; i++)
        vec[i] = i + 1;

    // Add a new integer at the end
    printf("Enter a new integer: ");
    scanf("%d", &newElement);

    // Resize the vector and add the new element
    vec = realloc(vec, 4 * sizeof(int));
    vec[3] = newElement;

    // Print the updated vector
    printf("Updated vector: ");
    for (i = 0; i < 4; i++)
        printf("%d ", vec[i]);
    printf("\n");

    // Free allocated memory
    free(vec);

    return 0;
}
```

3- Write a program that initializes a vector with five integers, removes the last element, and prints the updated vector.

اكتب برنامجًا يقوم بتهيئة vector بخمسة أعداد صحيحة، وإزالة العنصر الأخير، وطباعة vector المحدث.

Output

```
Updated vector: 1 2 3 4
```

Solution

```
// www.gammal.tech

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

int main() {
    int *vec, i;

    // Initialize vector with five elements
    vec = (int*)malloc(5 * sizeof(int));
    for (i = 0; i < 5; i++)
        vec[i] = i + 1;

    // Remove the last element
    vec = realloc(vec, 4 * sizeof(int));

    // Print the updated vector
    printf("Updated vector: ");
    for (i = 0; i < 4; i++)
        printf("%d ", vec[i]);
    printf("\n");

    // Free allocated memory
    free(vec);

    return 0;
}
```

4- Write a program that initializes a vector with four integers, doubles the size of the vector, and assigns the value 10 to the new elements.

اكتب برنامجا يقوم بتهيئة vector بأربعة أعداد صحيحة، ويضاعف حجم vector ويعين القيمة 10 للعناصر الجديدة.

Output

```
Updated vector: 1 2 3 4 10 10 10 10
```

Solution

```
// www.gammal.tech

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

int main() {
    int *vec, i;

    // Initialize vector with four elements
    vec = (int*)malloc(4 * sizeof(int));
    for (i = 0; i < 4; i++)
        vec[i] = i + 1;

    // Double the size of the vector and assign value 10 to new elements
    vec = realloc(vec, 8 * sizeof(int));
    for (i = 4; i < 8; i++)
        vec[i] = 10;

    // Print the updated vector
    printf("Updated vector: ");
    for (i = 0; i < 8; i++)
        printf("%d ", vec[i]);
    printf("\n");

    // Free allocated memory
    free(vec);

    return 0;
}
```

5- Write a program that initializes a vector with three integers, inserts a new integer at the beginning, and prints the updated vector.

اكتب برنامجًا يقوم بتهيئة vector بثلاثة أعداد صحيحة، وإدراج عدد صحيح جديد في البداية، وطباعة vector المحدث.

Input

```
Enter a new integer: 10
```

Output

```
Updated vector: 10 1 2 3
```

Solution

```
// www.gammal.tech

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

int main() {
    int *vec, i, newElement;

    // Initialize vector with three elements
    vec = (int*)malloc(3 * sizeof(int));
    for (i = 0; i < 3; i++)
        vec[i] = i + 1;

    // Insert a new integer at the beginning
    printf("Enter a new integer: ");
    scanf("%d", &newElement);

    // Resize the vector and shift elements to make room for the new element
    vec = realloc(vec, 4 * sizeof(int));
    for (i = 3; i > 0; i--)
        vec[i] = vec[i - 1];
    vec[0] = newElement;

    // Print the updated vector
    printf("Updated vector: ");
    for (i = 0; i < 4; i++)
        printf("%d ", vec[i]);
    printf("\n");

    // Free allocated memory
    free(vec);

    return 0;
}
```

6- Write a program that initializes a vector with five integers and finds the sum of all elements.

اكتب برنامجًا يقوم بتهيئة vector بخمسة أعداد صحيحة وإيجاد مجموع جميع العناصر.

Output

```
Sum of vector elements: 15
```

Solution

```
// www.gammal.tech

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

int main() {
    int *vec, i, sum = 0;

    // Initialize vector with five elements
    vec = (int*)malloc(5 * sizeof(int));
    for (i = 0; i < 5; i++)
        vec[i] = i + 1;

    // Calculate the sum of all elements
    for (i = 0; i < 5; i++)
        sum += vec[i];

    // Print the sum
    printf("Sum of vector elements: %d\n", sum);

    // Free allocated memory
    free(vec);

    return 0;
}
```

7- Write a program that initializes two vectors with three integers each, calculates the element-wise sum, and prints the resulting vector.

اكتب برنامجًا يقوم بتهيئة two vectors يحتوي كل منهما على ثلاثة أعداد صحيحة، ويحسب مجموع العناصر الأول والثاني في كل عنصر ويسجله في الثالث ، ويطبع vector الناتج.

Output

```
Resulting vector (element-wise sum): 5 7 9
```

Solution

```
// www.gammal.tech

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

int main() {
    int *vec1, *vec2, *result;
    int i;

    // Initialize two vectors with three elements each
    vec1 = (int*)malloc(3 * sizeof(int));
    vec2 = (int*)malloc(3 * sizeof(int));

    for (i = 0; i < 3; i++) {
        vec1[i] = i + 1;
        vec2[i] = i + 4;
    }

    // Calculate the element-wise sum and store it in a new vector
    result = (int*)malloc(3 * sizeof(int));

    for (i = 0; i < 3; i++) {
        result[i] = vec1[i] + vec2[i];
    }

    // Print the resulting vector
    printf("Resulting vector (element-wise sum): ");
    for (i = 0; i < 3; i++) {
        printf("%d ", result[i]);
    }
    printf("\n");

    // Free allocated memory
    free(vec1);
    free(vec2);
    free(result);

    return 0;
}
```

8- Write a program that initializes a vector with five integers, finds and prints the maximum element.

اكتب برنامجًا يقوم بتهيئة vector بخمسة أعداد صحيحة، ثم يبحث عن الحد الأقصى للعنصر ويطبعه.

Output

```
Maximum element in the vector: 5
```

Solution

```
// www.gammal.tech

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

int main() {
    int *vec, i, max;

    // Initialize vector with five elements
    vec = (int*)malloc(5 * sizeof(int));
    for (i = 0; i < 5; i++)
        vec[i] = i + 1;

    // Find the maximum element in the vector
    max = vec[0];
    for (i = 1; i < 5; i++) {
        if (vec[i] > max) {
            max = vec[i];
        }
    }

    // Print the maximum element
    printf("Maximum element in the vector: %d\n", max);

    // Free allocated memory
    free(vec);

    return 0;
}
```


9- Write a program that initializes a vector with six integers, counts and prints the number of even elements in the vector.

اكتب برنامجًا يقوم بتهيئة vector بستة أعداد صحيحة، ثم يقوم بعد وطباعة عدد العناصر الزوجية في vector.

Output

```
Number of even elements in the vector: 3
```

Solution

```
// www.gammal.tech

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

int main() {
    int *vec, i, count = 0;

    // Initialize vector with six elements
    vec = (int*)malloc(6 * sizeof(int));
    for (i = 0; i < 6; i++)
        vec[i] = i + 1;

    // Count the number of even elements in the vector
    for (i = 0; i < 6; i++) {
        if (vec[i] % 2 == 0) {
            count++;
        }
    }

    // Print the count of even elements
    printf("Number of even elements in the vector: %d\n", count);

    // Free allocated memory
    free(vec);

    return 0;
}
```

10- Write a program that initializes a vector with four integers, calculates and prints the average of all elements.

اكتب برنامجًا يقوم بتهيئة vector بأربعة أعداد صحيحة، ويحسب ويطبّع متوسط جميع العناصر.

Output

```
Average of vector elements: 2.50
```

Solution

```
// www.gammal.tech

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

int main() {
    int *vec, i, sum = 0;
    float average;

    // Initialize vector with four elements
    vec = (int*)malloc(4 * sizeof(int));
    for (i = 0; i < 4; i++)
        vec[i] = i + 1;

    // Calculate the sum of all elements
    for (i = 0; i < 4; i++)
        sum += vec[i];

    // Calculate the average
    average = (float)sum / 4;

    // Print the average
    printf("Average of vector elements: %.2f\n", average);

    // Free allocated memory
    free(vec);

    return 0;
}
```