

1- Write a program to create a linked list of numbers entered by the user.

اكتب برنامجًا لإنشاء linked list بالأرقام التي يدخلها المستخدم.

Input

```
Enter a number that represents the number of numbers in the  
linked list: 4  
Enter number: 1  
Enter number: 2  
Enter number: 3  
Enter number: 4
```

Output

```
1 2 3 4
```

Solution

```
// www.gammal.tech

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

struct gammal {
    int number;
    struct gammal* next;
};

struct gammal* add(struct gammal* g) {
    if (g == NULL) {
        g = (struct gammal*)malloc(sizeof(struct gammal));
        printf("Enter number: ");
        scanf("%d", &g->number);
        g->next = NULL;
        return g;
    }
    g->next = add(g->next);
    return g;
}

void show(struct gammal* g) {
    while (g != NULL) {
        printf("%d ", g->number);
        g = g->next;
    }
    printf("\n");
}

int main() {
    struct gammal* head = NULL;
    int numberSelect;
    printf("Enter a number that represents the number of numbers in the linked list: ");
    scanf("%d", &numberSelect);
    for (int i = 0; i < numberSelect; i++)
        head = add(head);
    show(head);
    return 0;
}
```

2- Write a program to find and print the sum of all numbers in the linked list using recursion.

اكتب برنامجًا للعثور على مجموع جميع الأرقام في القائمة linked list وطباعته
using recursion

Input

```
Enter a number that represents the number of numbers in the
linked list: 4
Enter number: 1
Enter number: 2
Enter number: 3
Enter number: 4
```

Output

Sum of numbers: 10

Solution

```
// www.gammal.tech

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

struct gammal {
    int number;
    struct gammal* next;
};

struct gammal* add(struct gammal* g) {
    if (g == NULL) {
        g = (struct gammal*)malloc(sizeof(struct gammal));
        printf("Enter number: ");
        scanf("%d", &g->number);
        g->next = NULL;
        return g;
    }
    g->next = add(g->next);
    return g;
}

int findSum(struct gammal* g) {
    if (g == NULL) {
        return 0;
    }
    return g->number + findSum(g->next);
}

int main() {
    struct gammal* head = NULL;
    int numberSelect;

    printf("Enter a number that represents the number of numbers in the linked list: ");
    scanf("%d", &numberSelect);

    for (int i = 0; i < numberSelect; i++)
        head = add(head);

    printf("Sum of numbers: %d\n", findSum(head));

    return 0;
}
```

3- Write a program to find and print the average of all numbers in the linked list using recursion.

اكتب برنامجًا للعثور على متوسط جميع الأرقام في linked list وطباعته using recursion.

Input

```
Enter a number that represents the number of numbers in the
linked list: 4
Enter number: 1
Enter number: 2
Enter number: 3
Enter number: 4
```

Output

```
Average of numbers: 2.50
```

Solution

```

// www.gammal.tech

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

struct gammal {
    int number;
    struct gammal* next;
};

struct gammal* add(struct gammal* g) {
    if (g == NULL) {
        g = (struct gammal*)malloc(sizeof(struct gammal));
        printf("Enter number: ");
        scanf("%d", &g->number);
        g->next = NULL;
        return g;
    }
    g->next = add(g->next);
    return g;
}

float findAverage(struct gammal* g, int sum, int count) {
    if (g == NULL) {
        return (float)sum / count;
    }
    return findAverage(g->next, sum + g->number, count + 1);
}

int main() {
    struct gammal* head = NULL;
    int numberSelect;

    printf("Enter a number that represents the number of numbers in the linked list: ");
    scanf("%d", &numberSelect);

    for (int i = 0; i < numberSelect; i++)
        head = add(head);

    printf("Average of numbers: %.2f\n", findAverage(head, 0, 0));

    return 0;
}
```

4- Write a program to find and print the product of all numbers in the linked list using recursion.

اكتب برنامجًا للعثور على ضرب جميع الأرقام في linked list وطباعته using recursion

Input

```
Enter a number that represents the number of numbers in the
linked list: 4
Enter number: 1
Enter number: 2
Enter number: 3
Enter number: 4
```

Output

```
Product of numbers: 24
```

Solution

```
// www.gammal.tech

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

struct gammal {
    int number;
    struct gammal* next;
};

struct gammal* add(struct gammal* g) {
    if (g == NULL) {
        g = (struct gammal*)malloc(sizeof(struct gammal));
        printf("Enter number: ");
        scanf("%d", &g->number);
        g->next = NULL;
        return g;
    }
    g->next = add(g->next);
    return g;
}

int findProduct(struct gammal* g) {
    if (g == NULL) {
        return 1; // Initialize with 1 for multiplication
    }
    return g->number * findProduct(g->next);
}

int main() {
    struct gammal* head = NULL;
    int numberSelect;

    printf("Enter a number that represents the number of numbers in the linked list: ");
    scanf("%d", &numberSelect);

    for (int i = 0; i < numberSelect; i++)
        head = add(head);

    printf("Product of numbers: %d\n", findProduct(head));

    return 0;
}
```

5- Write a program to count and print the number of even numbers in the linked list using recursion.

اكتب برنامجًا لحساب وطباعة عدد الأعداد الزوجية في linked list using recursion.

Input

```
Enter a number that represents the number of numbers in the  
linked list: 4  
Enter number: 1  
Enter number: 2  
Enter number: 3  
Enter number: 4
```

Output

```
Number of even numbers: 2
```

Solution

```
// www.gammal.tech

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

struct gammal {
    int number;
    struct gammal* next;
};

struct gammal* add(struct gammal* g) {
    if (g == NULL) {
        g = (struct gammal*)malloc(sizeof(struct gammal));
        printf("Enter number: ");
        scanf("%d", &g->number);
        g->next = NULL;
        return g;
    }
    g->next = add(g->next);
    return g;
}

int countEven(struct gammal* g) {
    if (g == NULL) {
        return 0;
    }
    int count = countEven(g->next);
    return (g->number % 2 == 0) ? count + 1 : count;
}

int main() {
    struct gammal* head = NULL;
    int numberSelect;

    printf("Enter a number that represents the number of numbers in the linked list: ");
    scanf("%d", &numberSelect);

    for (int i = 0; i < numberSelect; i++)
        head = add(head);

    printf("Number of even numbers: %d\n", countEven(head));

    return 0;
}
```

6- Write a program to find and print the largest number in the linked list using recursion.

اكتب برنامجًا للعثور على أكبر رقم في linked list وطباعته using recursion

Input

```
Enter a number that represents the number of numbers in the
linked list: 5
Enter number: 30
Enter number: 23
Enter number: 4
Enter number: 65
Enter number: 62
```

Output

```
Largest number: 65
```

Solution

```
// www.gammal.tech

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

struct gammal {
    int number;
    struct gammal* next;
};

struct gammal* add(struct gammal* g) {
    if (g == NULL) {
        g = (struct gammal*)malloc(sizeof(struct gammal));
        printf("Enter number: ");
        scanf("%d", &g->number);
        g->next = NULL;
        return g;
    }
    g->next = add(g->next);
    return g;
}

int findLargest(struct gammal* g, int largest) {
    if (g == NULL) {
        return largest;
    }
    return findLargest(g->next, (g->number > largest) ? g->number : largest);
}

int main() {
    struct gammal* head = NULL;
    int numberSelect;

    printf("Enter a number that represents the number of numbers in the linked list: ");
    scanf("%d", &numberSelect);

    for (int i = 0; i < numberSelect; i++)
        head = add(head);

    printf("Largest number: %d\n", findLargest(head, head->number));

    return 0;
}
```


7- Write a program to find and print the smallest number in the linked list using recursion.

اكتب برنامجًا للعثور على أصغر رقم في linked list وطباعته using recursion.

Input

```
Enter a number that represents the number of numbers in the
linked list: 4
Enter number: 50
Enter number: 30
Enter number: 90
Enter number: 70
```

Output

```
Smallest number: 30
```

Solution

```
// www.gammal.tech

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

struct gammal {
    int number;
    struct gammal* next;
};

struct gammal* add(struct gammal* g) {
    if (g == NULL) {
        g = (struct gammal*)malloc(sizeof(struct gammal));
        printf("Enter number: ");
        scanf("%d", &g->number);
        g->next = NULL;
        return g;
    }
    g->next = add(g->next);
    return g;
}

int findSmallest(struct gammal* g, int smallest) {
    if (g == NULL) {
        return smallest;
    }
    return findSmallest(g->next, (g->number < smallest) ? g->number : smallest);
}

int main() {
    struct gammal* head = NULL;
    int numberSelect;

    printf("Enter a number that represents the number of numbers in the linked list: ");
    scanf("%d", &numberSelect);

    for (int i = 0; i < numberSelect; i++)
        head = add(head);

    printf("Smallest number: %d\n", findSmallest(head, head->number));

    return 0;
}
```

8- Write a program to find and print the count of numbers greater than a given value in the linked list using recursion.

اكتب برنامجًا للعثور على عدد الأرقام الأكبر من قيمة معينة في linked list وطباعتها using recursion.

Input

```
Enter a number that represents the number of numbers in the
linked list: 4
Enter number: 1
Enter number: 2
Enter number: 3
Enter number: 4
Enter the threshold value: 1
```

Output

```
Count of numbers greater than 1: 3
```

Solution

```
// www.gammal.tech

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

struct gammal {
    int number;
    struct gammal* next;
};

struct gammal* add(struct gammal* g) {
    if (g == NULL) {
        g = (struct gammal*)malloc(sizeof(struct gammal));
        printf("Enter number: ");
        scanf("%d", &g->number);
        g->next = NULL;
        return g;
    }
    g->next = add(g->next);
    return g;
}

int countGreaterThan(struct gammal* g, int threshold) {
    if (g == NULL) {
        return 0;
    }
    int count = countGreaterThan(g->next, threshold);
    return (g->number > threshold) ? count + 1 : count;
}

int main() {
    struct gammal* head = NULL;
    int numberSelect, threshold;

    printf("Enter a number that represents the number of numbers in the linked list: ");
    scanf("%d", &numberSelect);

    for (int i = 0; i < numberSelect; i++)
        head = add(head);

    printf("Enter the threshold value: ");
    scanf("%d", &threshold);

    printf("Count of numbers greater than %d: %d\n", threshold, countGreaterThan(head, threshold));

    return 0;
}
```

9- Write a program to find and print the count of numbers less than a given value in the linked list using recursion.

اكتب برنامجًا للعثور على عدد الأرقام الأقل من قيمة معينة في linked list وطباعتها linked list.

Input

```
Enter a number that represents the number of numbers in the
linked list: 4
Enter number: 6
Enter number: 8
Enter number: 2
Enter number: 3
Enter the threshold value: 5
```

Output

```
Count of numbers less than 5: 2
```

Solution

```
// www.gammal.tech

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

struct gammal {
    int number;
    struct gammal* next;
};

struct gammal* add(struct gammal* g) {
    if (g == NULL) {
        g = (struct gammal*)malloc(sizeof(struct gammal));
        printf("Enter number: ");
        scanf("%d", &g->number);
        g->next = NULL;
        return g;
    }
    g->next = add(g->next);
    return g;
}

int countLessThan(struct gammal* g, int threshold) {
    if (g == NULL) {
        return 0;
    }
    int count = countLessThan(g->next, threshold);
    return (g->number < threshold) ? count + 1 : count;
}

int main() {
    struct gammal* head = NULL;
    int numberSelect, threshold;

    printf("Enter a number that represents the number of numbers in the linked list: ");
    scanf("%d", &numberSelect);

    for (int i = 0; i < numberSelect; i++)
        head = add(head);

    printf("Enter the threshold value: ");
    scanf("%d", &threshold);

    printf("Count of numbers less than %d: %d\n", threshold, countLessThan(head, threshold));

    return 0;
}
```

10- Write a program to find and print the sum of all numbers greater than a given value in the linked list using recursion.

اكتب برنامجًا للعثور على مجموع جميع الأرقام الأكبر من قيمة معينة في linked list وطباعته using recursion.

Input

```
Enter a number that represents the number of numbers in the
linked list: 4
Enter number: 1
Enter number: 2
Enter number: 3
Enter number: 4
Enter the threshold value: 1
```

Output

```
Sum of numbers greater than 1: 9
```

Solution

```
// www.gammal.tech

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

struct gammal {
    int number;
    struct gammal* next;
};

struct gammal* add(struct gammal* g) {
    if (g == NULL) {
        g = (struct gammal*)malloc(sizeof(struct gammal));
        printf("Enter number: ");
        scanf("%d", &g->number);
        g->next = NULL;
        return g;
    }
    g->next = add(g->next);
    return g;
}

int sumGreaterThan(struct gammal* g, int threshold) {
    if (g == NULL) {
        return 0;
    }
    int sum = sumGreaterThan(g->next, threshold);
    return (g->number > threshold) ? sum + g->number : sum;
}

int main() {
    struct gammal* head = NULL;
    int numberSelect, threshold;

    printf("Enter a number that represents the number of numbers in the linked list: ");
    scanf("%d", &numberSelect);

    for (int i = 0; i < numberSelect; i++)
        head = add(head);

    printf("Enter the threshold value: ");
    scanf("%d", &threshold);

    printf("Sum of numbers greater than %d: %d\n", threshold, sumGreaterThan(head, threshold));

    return 0;
}
```
