

Conversion of Infix to postfix

```
#include <stdio.h>
#include <stdlib.h>
#include <ctype.h>
#include <string.h>
#define MAX 100
typedef struct Stack {
    int top;
    char items[MAX];
} Stack;
void initStack(Stack* s) {
    s->top = -1;
}
int isEmpty(Stack* s) {
    return s->top == -1;
}
int isFull(Stack* s) {
    return s->top == MAX - 1;
}
void push(Stack* s, char item) {
    if (isFull(s)) {
        printf("Stack overflow\n");
        return;
    }
    s->items[++s->top] = item;
}
char pop(Stack* s) {
    if (isEmpty(s)) {
```

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        printf("Stack underflow\n");
        return '\0';
    }
    return s->items[s->top--];
}

char peek(Stack* s) {
    if (isEmpty(s)) {
        return '\0';
    }
    return s->items[s->top];
}

int precedence(char op) {
    switch (op) {
        case '+':
        case '-':
            return 1;
        case '*':
        case '/':
            return 2;
        case '^':
            return 3;
        default:
            return 0;
    }
}

int isOperator(char ch) {
    return ch == '+' || ch == '-' || ch == '*' || ch == '/' || ch == '^';
}

void infixToPostfix(char* infix, char* postfix) {
    Stack stack;
    initStack(&stack);

```

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int i = 0, j = 0;
char ch;
while ((ch = infix[i++]) != '\0') {
    if (isspace(ch)) continue;
    if (isalnum(ch)) {
        postfix[j++] = ch;
    } else if (ch == '(') {
        push(&stack, ch);
    } else if (ch == ')') {
        while (!isEmpty(&stack) && peek(&stack) != '(') {
            postfix[j++] = pop(&stack);
        }
        if (!isEmpty(&stack) && peek(&stack) == '(') {
            pop(&stack); // Pop the '('
        }
    } else if (isOperator(ch)) {
        while (!isEmpty(&stack) && precedence(peek(&stack)) >= precedence(ch)) {
            postfix[j++] = pop(&stack);
        }
        push(&stack, ch);
    }
}
while (!isEmpty(&stack)) {
    postfix[j++] = pop(&stack);
}
postfix[j] = '\0';
}

int main() {
    char infix[MAX], postfix[MAX];
    printf("Enter an infix expression: ");
    fgets(infix, MAX, stdin);

```

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infix[strcspn(infix, "\n")] = '\0';

infixToPostfix(infix, postfix);

printf("Postfix expression: %s\n", postfix);

return 0;
}

```

Input:

Enter an infix expression: ((a+b)-c*(d/e))+f

Output:

Postfix expression: ab+cde/*-f+

Queue Using Array

```

#include <stdio.h>

#include <stdlib.h>

#define MAX 5

typedef struct {
    int items[MAX];
    int front;
    int rear;
} Queue;

void initQueue(Queue* q) {
    q->front = -1;
    q->rear = -1;
}

int isFull(Queue* q) {
    return q->rear == MAX - 1;
}

int isEmpty(Queue* q) {
    return q->front == -1 || q->front > q->rear;
}

```

```

void enqueue(Queue* q, int item) {
    if (isFull(q)) {
        printf("Queue is full\n");
        return;
    }
    if (q->front == -1) {
        q->front = 0;
    }
    q->items[++q->rear] = item;
    printf("%d enqueued to queue\n", item);
}

int dequeue(Queue* q) {
    if (isEmpty(q)) {
        printf("Queue is empty\n");
        return -1;
    }
    return q->items[q->front++];
}

void display(Queue* q) {
    if (isEmpty(q)) {
        printf("Queue is empty\n");
        return;
    }
    printf("Queue elements: ");
    for (int i = q->front; i <= q->rear; i++) {
        printf("%d ", q->items[i]);
    }
    printf("\n");
}

int main() {
    Queue q;

```

```
initQueue(&q);
enqueue(&q, 10);
enqueue(&q, 20);
enqueue(&q, 30);

display(&q);
dequeue(&q);
display(&q);
return 0;
}
```

Output:

```
10 enqueued to queue
20 enqueued to queue
30 enqueued to queue
Queue elements: 10 20 30
10 dequeued from queue
Queue elements: 20 30
```

Queue using Linked List

```
#include <stdio.h>
#include <stdlib.h>
typedef struct Node {
    int data;
    struct Node* next;
} Node;
typedef struct {
    Node* front;
    Node* rear;
} Queue;
```

```

Node* newNode(int data) {
    Node* temp = (Node*)malloc(sizeof(Node));
    temp->data = data;
    temp->next = NULL;
    return temp;
}

void initQueue(Queue* q) {
    q->front = q->rear = NULL;
}

int isEmpty(Queue* q) {
    return q->front == NULL;
}

void enqueue(Queue* q, int data) {
    Node* temp = newNode(data);
    if (q->rear == NULL) {
        q->front = q->rear = temp;
        printf("%d enqueued to queue\n", data);
        return;
    }
    q->rear->next = temp;
    q->rear = temp;
    printf("%d enqueued to queue\n", data);
}

int dequeue(Queue* q) {
    if (isEmpty(q)) {
        printf("Queue is empty\n");
        return -1;
    }
    Node* temp = q->front;
    int data = temp->data;
    q->front = q->front->next;

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    if (q->front == NULL) {
        q->rear = NULL;
    }
    free(temp);
    printf("%d dequeued from queue\n", data);
    return data;
}

void display(Queue* q) {
    if (isEmpty(q)) {
        printf("Queue is empty\n");
        return;
    }
    Node* temp = q->front;
    printf("Queue elements: ");
    while (temp != NULL) {
        printf("%d ", temp->data);
        temp = temp->next;
    }
    printf("\n");
}

int main() {
    Queue q;
    initQueue(&q);
    enqueue(&q, 10);
    enqueue(&q, 20);
    enqueue(&q, 30);
    display(&q);
    dequeue(&q);
    display(&q);
    return 0;
}

```


Output:

10 enqueued to queue

20 enqueued to queue

30 enqueued to queue

Queue elements: 10 20 30

10 dequeued from queue

Queue elements: 20 30