Number System Conversions (Manual - No Built-ins)

Decimal to Binary

```
int num = 25;
String binary = "";
while (num > 0) {
    int rem = num % 2;
    binary = rem + binary;
    num = num / 2;
}
System.out.println("Binary: " + binary);
```

Binary to Decimal

```
String binary = "11001";
int decimal = 0;
int power = 0;
for (int i = binary.length() - 1; i >= 0; i--) {
    int bit = binary.charAt(i) - '0';
    decimal += bit * Math.pow(2, power);
    power++;
}
System.out.println("Decimal: " + decimal);
```

Decimal to Octal

```
int num = 25;
String octal = "";
while (num > 0) {
    int rem = num % 8;
    octal = rem + octal;
    num /= 8;
}
System.out.println("Octal: " + octal);
```

Octal to Decimal

```
String octal = "31";
int decimal = 0;
int power = 0;
for (int i = octal.length() - 1; i >= 0; i--) {
    int digit = octal.charAt(i) - '0';
    decimal += digit * Math.pow(8, power);
    power++;
}
System.out.println("Decimal: " + decimal);
```

Decimal to Hexadecimal

```
int num = 255;
String hex = "";
char[] hexDigits = "0123456789ABCDEF".toCharArray();
while (num > 0) {
```

```
    int rem = num % 16;
    hex = hexDigits[rem] + hex;
    num /= 16;
}
System.out.println("Hex: " + hex);
```

Hexadecimal to Decimal

```
String hex = "FF";
int decimal = 0;
int power = 0;
for (int i = hex.length() - 1; i >= 0; i--) {
    char ch = hex.charAt(i);
    int value;
    if (ch >= '0' && ch <= '9')
        value = ch - '0';
    else
        value = ch - 'A' + 10;
    decimal += value * Math.pow(16, power);
    power++;
}
System.out.println("Decimal: " + decimal);
```

Decimal to BCD (Binary Coded Decimal)

```
int num = 259;
String bcd = "";
String str = Integer.toString(num);
for (int i = 0; i < str.length(); i++) {
    int digit = str.charAt(i) - '0';
    String bin = "";
    while (digit > 0) {
        bin = (digit % 2) + bin;
        digit = digit / 2;
    }
    while (bin.length() < 4) {
        bin = "0" + bin;
    }
    bcd += bin + " ";
}
System.out.println("BCD: " + bcd.trim());
```