ASSIGNMENT-1

Design a calculator program to handle numeric operations and number system conversions. The program should: calculate square and cube of a decimal number; convert binary input to decimal, octal, and hexadecimal; check for Armstrong and Happy numbers; and find the sum of digits of any number, ensuring the result is a single digit. Provide clean prompts and accurate formatted outputs.

PROGRAM:-

```
def square_and_cube(number):
    square = round(number ** 2, 2)
    cube = round(number ** 3, 3)
    print(f"Square: {square}, Cube: {cube}")



def binary_conversions(binary_str):
    try:
        decimal = int(binary_str, 2)
        octal = oct(decimal)[2:]
        hexa = hex(decimal)
        print(f"Decimal: {decimal}, Octal: {octal}, Hex: {hexa}")
    except ValueError:
        print("Invalid binary number. Please enter only 0s and 1s.")



def is_armstrong(num):
    digits = [int(d) for d in str(num)]
    power = len(digits)
    armstrong_sum = sum(d ** power for d in digits)
    if armstrong_sum == num:
        print("Armstrong Number")
    else:
```

```
        print("Not an Armstrong Number")



def is_happy_number(n):
    seen = set()
    while n != 1 and n not in seen:
        seen.add(n)
        n = sum(int(d) ** 2 for d in str(n))
    print("True" if n == 1 else "False")



def sum_to_single_digit(n):
    while n >= 10:
        n = sum(int(d) for d in str(n))
    print(f"Sum: {n}")



def main():
    while True:
        print("\n--- Calculator Menu ---")
        print("1. Square and Cube of a Decimal Number")
        print("2. Convert Binary to Decimal, Octal, and Hexadecimal")
        print("3. Check Armstrong Number")
        print("4. Check Happy Number")
        print("5. Sum Digits Until Single Digit")
        print("6. Exit")

        choice = input("Enter your choice (1-6): ").strip()
```

```
if choice == "1":
    try:
        num = float(input("Enter a decimal number: ").strip())
        square_and_cube(num)
    except ValueError:
        print("Invalid input. Please enter a valid decimal number.")

elif choice == "2":
    binary_str = input("Enter a binary number (e.g., 1101): ").strip()
    binary_conversions(binary_str)

elif choice == "3":
    try:
        num = int(input("Enter a number to check for Armstrong: ").strip())
        is_armstrong(num)
    except ValueError:
        print("Invalid input. Please enter an integer.")

elif choice == "4":
    try:
        num = int(input("Enter a number to check for Happy: ").strip())
        is_happy_number(num)
    except ValueError:
        print("Invalid input. Please enter an integer.")

elif choice == "5":
    try:
        num = int(input("Enter a number to sum digits: ").strip())
        sum_to_single_digit(num)
```

```
            except ValueError:
                print("Invalid input. Please enter an integer.")

        elif choice == "6":
            print("Exiting the program.")
            break
        else:
            print("Invalid choice. Please select a number between 1 and 6.")


if __name__ == "__main__":
    main()
```

Output

```
--- Calculator Menu ---
1. Square and Cube of a Decimal Number
2. Convert Binary to Decimal, Octal, and Hexadecimal
3. Check Armstrong Number
4. Check Happy Number
5. Sum Digits Until Single Digit
6. Exit
Enter your choice (1-6): 1
Enter a decimal number: 0.6
Square: 0.36, Cube: 0.216

--- Calculator Menu ---
1. Square and Cube of a Decimal Number
2. Convert Binary to Decimal, Octal, and Hexadecimal
3. Check Armstrong Number
4. Check Happy Number
5. Sum Digits Until Single Digit
6. Exit
Enter your choice (1-6): 2
Enter a binary number (e.g., 1101): 1101
Decimal: 13, Octal: 15, Hex: 0xd
```

```
--- Calculator Menu ---
1. Square and Cube of a Decimal Number
2. Convert Binary to Decimal, Octal, and Hexadecimal
3. Check Armstrong Number
4. Check Happy Number
5. Sum Digits Until Single Digit
6. Exit
Enter your choice (1-6): 3
Enter a number to check for Armstrong: 153
Armstrong Number

--- Calculator Menu ---
1. Square and Cube of a Decimal Number
2. Convert Binary to Decimal, Octal, and Hexadecimal
3. Check Armstrong Number
4. Check Happy Number
5. Sum Digits Until Single Digit
6. Exit
Enter your choice (1-6): 4
Enter a number to check for Happy: 19
True
```

```
--- Calculator Menu ---
1. Square and Cube of a Decimal Number
2. Convert Binary to Decimal, Octal, and Hexadecimal
3. Check Armstrong Number
4. Check Happy Number
5. Sum Digits Until Single Digit
6. Exit
Enter your choice (1-6): 5
Enter a number to sum digits: 143
Sum: 8
```