Python Lab Programs

1. Arithmetic Operators

```
a = int(input("Enter first number: "))
b = int(input("Enter second number: "))

print(f"Addition: {a + b}")
print(f"Subtraction: {a - b}")
print(f"Multiplication: {a * b}")
print(f"Division: {a / b}")
print(f"Modulus: {a % b}")
```

2. Comparison Operators

```
a = int(input("Enter first number: "))
b = int(input("Enter second number: "))

print(f"{a} == {b}: {a == b}")
print(f"{a} != {b}: {a != b}")
print(f"{a} > {b}: {a > b}")
print(f"{a} < {b}: {a < b}")
print(f"{a} >= {b}: {a >= b}")
print(f"{a} <= {b}: {a <= b}")
```

3. Logical Operators

```
a = bool(int(input("Enter first boolean value (0 or 1): ")))
b = bool(int(input("Enter second boolean value (0 or 1): ")))

print(f"{a} and {b}: {a and b}")
print(f"{a} or {b}: {a or b}")
print(f"not {a}: {not a}")
```

4. If-Else Statements

```
num = int(input("Enter a number: "))

if num > 0:
    print("The number is positive")
elif num == 0:
    print("The number is zero")
else:
    print("The number is negative")
```

5. For Loop

```
n = int(input("Enter a number: "))
for i in range(1, n + 1):
    print(i)
```

6. While Loop

```
num = int(input("Enter a number: "))
i = 1
while i <= num:
    print(i)
    i += 1
```

7. Nested Loop

```
n = int(input("Enter the number of rows: "))
for i in range(1, n + 1):
    for j in range(1, i + 1):
        print("*", end=" ")
    print()
```

8. Break and Continue

```
for i in range(1, 11):
    if i == 5:
        continue  # Skip the rest of the code inside the loop for current iteration
    if i == 8:
        break  # Exit the loop
    print(i)
```

9. List Comprehension with Condition

```
numbers = [x for x in range(20) if x % 2 == 0]
print(numbers)
```

10. Try-Except for Error Handling

```
try:
```

```
        a = int(input("Enter a number: "))
        b = int(input("Enter another number: "))
        result = a / b
        print(f"Result: {result}")
    except ZeroDivisionError:
        print("Error: Division by zero is not allowed")
    except ValueError:
        print("Error: Invalid input, please enter a number")
```

11. Calculator Program

```
def calculator(operation, num1, num2):
    switcher = {
        'add': num1 + num2,
        'subtract': num1 - num2,
        'multiply': num1 * num2,
        'divide': num1 / num2 if num2 != 0 else 'Error: Division by zero'
    }
    return switcher.get(operation, 'Invalid operation')

# Example usage:
print(calculator('add', 10, 5))        # Output: 15
print(calculator('subtract', 10, 5))   # Output: 5
print(calculator('multiply', 10, 5))   # Output: 50
print(calculator('divide', 10, 5))     # Output: 2.0
print(calculator('divide', 10, 0))     # Output: Error: Division by zero
print(calculator('mod', 10, 5))        # Output: Invalid operation
```

12. Day of the Week Program

```
def day_of_week(day_number):
```

```
    switcher = {
        1: "Sunday",
        2: "Monday",
        3: "Tuesday",
        4: "Wednesday",
        5: "Thursday",
        6: "Friday",
        7: "Saturday"
    }
    return switcher.get(day_number, "Invalid day number")

# Example usage:
print(day_of_week(1))  # Output: Sunday
print(day_of_week(8))  # Output: Invalid day number
```

13. Grade to GPA Converter

```
def grade_to_gpa(grade):
    switcher = {
        'A': 4.0,
        'B': 3.0,
        'C': 2.0,
        'D': 1.0,
        'F': 0.0
    }
    return switcher.get(grade, "Invalid grade")
```

```
# Example usage:
print(grade_to_gpa('A'))  # Output: 4.0
print(grade_to_gpa('E'))  # Output: Invalid grade
```

14. Month Days Program

```
def days_in_month(month):
    switcher = {
        'January': 31,
        'February': 28,  # Ignoring leap year for simplicity
        'March': 31,
        'April': 30,
        'May': 31,
        'June': 30,
        'July': 31,
        'August': 31,
        'September': 30,
        'October': 31,
        'November': 30,
        'December': 31
    }
    return switcher.get(month, "Invalid month")

# Example usage:
print(days_in_month('February'))  # Output: 28
```

```
print(days_in_month('April'))     # Output: 30
print(days_in_month('Invalid'))   # Output: Invalid month
```

15. Animal Sound Program

```
def animal_sound(animal):
    switcher = {
        'dog': 'bark',
        'cat': 'meow',
        'cow': 'moo',
        'lion': 'roar'
    }
    return switcher.get(animal, "Unknown sound")

# Example usage:
print(animal_sound('dog'))   # Output: bark
print(animal_sound('cat'))   # Output: meow
print(animal_sound('giraffe'))  # Output: Unknown sound
```

16. Shape Area Calculator

```
def shape_area(shape, dimension):
    if shape == 'circle':
        return 3.14 * (dimension ** 2)
    elif shape == 'square':
        return dimension ** 2
    elif shape == 'triangle':
```

```
        return 0.5 * dimension[0] * dimension[1]  # dimension is (base, height)
    else:
        return "Invalid shape"
# Example usage:
print(shape_area('circle', 5))        # Output: 78.5
print(shape_area('square', 4))        # Output: 16
print(shape_area('triangle', (3, 4))) # Output: 6.0
print(shape_area('hexagon', 5))       # Output: Invalid shape
```

17. Traffic Light Program

```
def traffic_light(action):
    switcher = {
        'red': 'Stop',
        'yellow': 'Slow down',
        'green': 'Go'
    }
    return switcher.get(action, "Invalid action")
# Example usage:
print(traffic_light('red'))     # Output: Stop
print(traffic_light('yellow'))  # Output: Slow down
print(traffic_light('green'))   # Output: Go
print(traffic_light('blue'))    # Output: Invalid action
```

18. Temperature Converter

```
def temperature_converter(scale, temperature):
```

```
    if scale == 'C_to_F':
        return (temperature * 9/5) + 32
    elif scale == 'F_to_C':
        return (temperature - 32) * 5/9
    else:
        return "Invalid scale"
# Example usage:
print(temperature_converter('C_to_F', 0))    # Output: 32.0
print(temperature_converter('F_to_C', 32))   # Output: 0.0
print(temperature_converter('K_to_C', 273))  # Output: Invalid scale
```

19. Simple Command Line Argument Parser

```
import sys
def cli_parser(command):
    switcher = {
        'start': "Starting the program...",
        'stop': "Stopping the program...",
        'restart': "Restarting the program..."
    }
    return switcher.get(command, "Unknown command")
# Example usage:
if len(sys.argv) > 1:
    print(cli_parser(sys.argv[1]))
else:
    print("No command provided")
```

20. Currency Converter

```
def currency_converter(amount, currency):
    rates = {
        'USD_to_EUR': 0.85,
        'EUR_to_USD': 1.18,
        'USD_to_GBP': 0.75,
        'GBP_to_USD': 1.33
    }
    rate = rates.get(currency, None)
    if rate:
        return amount * rate
    else:
        return "Invalid currency pair"
# Example usage:
print(currency_converter(100, 'USD_to_EUR'))  # Output: 85.0
print(currency_converter(100, 'EUR_to_USD'))  # Output: 118.0
print(currency_converter(100, 'USD_to_INR'))  # Output: Invalid currency pair
```