

Weekly Homework — Week 02, Term 1

PM2 Test Prep — Control Flow Practice Problems

Programming Module 2 | Applied Computing Australia

Name	Date
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Part A: Predict the Output

What will each code snippet print? Write your answer before checking. Trace through the code line by line.

A1. Simple if/else

```
panel_count = 24
if panel_count > 20:
    print("Large system")
else:
    print("Standard system")
print(f"{panel_count} panels installed")
```

Output:

A2. if/elif/else chain

```
efficiency = 19.5
if efficiency >= 22:
    rating = "Premium"
elif efficiency >= 20:
    rating = "High"
elif efficiency >= 18:
    rating = "Standard"
else:
    rating = "Low"
print(f"Rating: {rating}")
```

Output:

A3. Logical and

```
system_size = 6.6
has_rebate = True
if system_size <= 10 and has_rebate:
    cost = 5000
    discount = 1400
    print(f"Cost after rebate: ${cost - discount}")
else:
    print(f"Full cost applies")
```

Output:

A4. The not operator

```
has_battery = False
is_north_facing = True
if not has_battery:
    print("Battery recommended")
if not is_north_facing:
    print("Panel tilt adjustment needed")
print(f"Battery: {has_battery}, North: {is_north_facing}")
```

Output:

A5. for loop with range(5)

```
total_cost = 0
price_per_panel = 400
for i in range(5):
    total_cost = total_cost + price_per_panel
    print(f"Panel {i}: ${total_cost}")
```

Output:

A6. for loop with range(2, 8)

```
for year in range(2, 8):
    savings = year * 1200
    print(f"Year {year}: ${savings}")
```

Output:

A7. while loop with accumulator

```
bill = 800
months = 0
while bill > 200:
    bill = bill - 150
    months = months + 1
print(f"Months: {months}, Remaining: ${bill}")
```

Output:

A8. Nested if inside for loop

```
for panels in range(5, 30, 10):
    if panels < 10:
        tier = "Small"
    elif panels < 20:
        tier = "Medium"
    else:
        tier = "Large"
    print(f"{panels} panels: {tier}")
```

Output:

Part B: Find the Error

Each snippet has a bug. Identify the error and explain the fix.

B1. Missing colon

```
roof_area = 45
if roof_area > 40
    print("Enough space for solar")
```

Error:

Fix:

B2. Assignment instead of comparison

```
system_type = "premium"
if system_type = "premium":
    print("Top-tier system selected")
```

Error:

Fix:

B3. Infinite while loop

```
cost = 10000
annual_savings = 2000
years = 0
while cost > 0:
    print(f"Year {years}: ${cost} remaining")
    years = years + 1
```

Error:**Fix:****B4. Off-by-one error in range()**

```
# Should print years 1 through 5
for year in range(5):
    savings = year * 1200
    print(f"Year {year}: ${savings}")
```

Error:**Fix:****B5. and where or is needed**

```
roof_area = -10
# Validation: reject values outside 10-200
while roof_area < 10 and roof_area > 200:
    print("Error: must be 10-200 m²")
    roof_area = int(input("Enter roof area: "))
```

Error:**Fix:****B6. Indentation error in elif**

```
bill = 350
if bill < 200:
    size = 3.3
elif bill < 400:
size = 5.0
elif bill < 600:
    size = 6.6
print(f"{size} kW")
```

Error:**Fix:****Part C: Fill in the Blanks**

Complete the code by filling in each blank (____).

C1. Solar panel sizing with if/elif/else

```
quarterly_bill = float(input("Enter quarterly bill ($): "))

if quarterly_bill ____ 200:
    system_size = 3.3
    print("Low usage")
____ quarterly_bill < 500:
    system_size = 6.6
    print("Medium usage")
____:
    system_size = 10.0
    print("High usage")

print(f"Recommended: {system_size} kW")
```

C2. Yearly savings with for loop

```

annual_savings = 1500
total = 0

for year in range(____, ____):
    total = total ____ annual_savings
    print(f"Year {year}: Total saved = ${total}")

print(f"5-year total: ${total}")

```

C3. Input validation with while loop

```

panel_count = int(input("Number of panels (1-50): "))

while panel_count ____ 1 or panel_count ____ 50:
    print("Invalid! Must be between 1 and 50.")
    panel_count = int(input("Number of panels (1-50): "))

print(f"Installing {panel_count} panels")

```

C4. Compound growth with ** operator

```

initial_bill = 400 # quarterly bill
growth_rate = 1.03 # 3% annual increase

# Calculate the bill after 10 years using compound growth
future_bill = initial_bill * growth_rate ____ 10

print(f"Current quarterly bill: ${initial_bill}")
print(f"Bill after 10 years: ${future_bill ____}")

```

Part D: Write the Code

Write complete programs from scratch. Use correct indentation and snake_case variable names.

D1. Solar tier classifier

Given a panel efficiency percentage (entered by the user as a decimal/float), classify it:

- Below 17%: "Economy"
- 17% to 19.9%: "Standard"
- 20% to 22.9%: "High Efficiency"
- 23% and above: "Premium"

Print the efficiency and its classification. Use if/elif/else.

D2. 5-year savings projection

Starting annual savings = \$1,200. Electricity prices increase 3% each year (compound growth using **).
 Use a for loop with range() to print each year's savings and a running total over 5 years.
 Formula: `year_savings = base_savings * 1.03 ** year`

D3. Input validation

Write a while loop that asks the user for a roof area in m². Valid values are 10 to 200 (inclusive). If the input is invalid, print an error message and ask again. When valid, print the accepted value and whether it qualifies as a large installation (over 100 m²).

Part E: Boolean Expression Table

Given the following variables, evaluate each expression to True or False.

panels = 12
 efficiency = 19.5
 has_rebate = True
 bill = 450

Expression	True / False
panels > 10 and efficiency > 20	
panels <= 12 or bill > 500	
not has_rebate	
not (bill < 400) and has_rebate	
panels >= 10 and not (efficiency < 18)	
bill > 400 or (panels < 5 and not has_rebate)	
(panels > 15 or efficiency > 20) and has_rebate	
not (has_rebate and bill < 400) or panels == 12	