FOUNDATION LESSON

WEEK 6 · LESSON 4

Cash-flow measures and rolling windows

Cash flow measures money movements; a rolling window summarises a stated set of ordered observations.

THE MENTAL MODEL

MENTAL MODEL

The mental model

Cash flow measures money movements; a rolling window summarises a stated set of ordered observations.

A STATED CAPEX CONVENTION

CODE WALKTHROUGH W06-L04-S03

```
01  profit=80; operating_cash_flow=65; capex=20
02  if capex<0:
03      raise ValueError("CapEx must be a nonnegative outflow")
04  print("Profit:",profit)
05  print("Free cash flow:",operating_cash_flow-capex)
```

WHAT TO TRACK

A stated CapEx convention

PREDICT THE RESULT

Predict the output.
Explain each operation.
Pause before continuing.

A STATED CAPEX CONVENTION · RESULT

CODE WALKTHROUGH W06-L04-S04

```
profit=80; operating_cash_flow=65; capex=20
if capex<0:
    raise ValueError("CapEx must be a nonnegative outflow")
print("Profit:",profit)
print("Free cash flow:",operating_cash_flow-capex)
```

WHAT TO TRACK

A stated CapEx convention

VALIDATE THE RESULT

```
Profit: 80
Free cash flow: 45
```

GROUPED THREE-OBSERVATION MEANS

CODE WALKTHROUGH W06-L04-S05

```
01  import pandas as pd
02  d=pd.DataFrame({"entity":["A","A","A","B","B","B"],
03   "month":[1,2,3,1,2,3],"cfo":[10,20,30,100,200,300]})
04  d=d.sort_values(["entity","month"])
05  def three_observation_mean(values):
06      return values.rolling(3,min_periods=3).mean()
07  d["rolling_cfo"]=d.groupby("entity")["cfo"].transform(
08      three_observation_mean)
09  print(d.to_string(index=False))
```

WHAT TO TRACK

Grouped three-observation means

PREDICT THE RESULT

Predict the output.
Explain each operation.
Pause before continuing.

GROUPED THREE-OBSERVATION MEANS · RESULT

CODE WALKTHROUGH W06-L04-S06 1/2

```
01  import pandas as pd
02  d=pd.DataFrame({"entity":["A","A","A","B","B","B"],
03   "month":[1,2,3,1,2,3],"cfo":[10,20,30,100,200,300]})
04  d=d.sort_values(["entity","month"])
05  def three_observation_mean(values):
06      return values.rolling(3,min_periods=3).mean()
07  d["rolling_cfo"]=d.groupby("entity")["cfo"].transform(
08      three_observation_mean)
09  print(d.to_string(index=False))
```

WHAT TO TRACK

Grouped three-observation means

VALIDATE THE RESULT

```
entity  month  cfo
rolling_cfo
     A      1   10
NaN
     A      2   20
NaN
     A      3   30
20.0
     B      1  100
NaN
     B      2  200
NaN
```

GROUPED THREE-OBSERVATION MEANS · RESULT

CODE WALKTHROUGH W06-L04-S06 2/2

WHAT TO TRACK

Grouped three-observation means

VALIDATE THE RESULT

```
     B       3  300
200.0
```

THREE ROWS WITH A MISSING MONTH

CODE WALKTHROUGH W06-L04-S07

```
01  months=[1,3,4]
02  if any(b-a!=1 for a,b in zip(months,months[1:])):
03      raise ValueError("Monthly coverage is not consecutive")
```

WHAT TO TRACK

Three rows with a missing month

PREDICT THE RESULT

Predict the output.
Explain each operation.
Pause before continuing.

THREE ROWS WITH A MISSING MONTH · RESULT

CODE WALKTHROUGH W06-L04-S08

```
01 months=[1,3,4]
02 if any(b-a!=1 for a,b in zip(months,months[1:])):
03     raise ValueError("Monthly coverage is not consecutive")
```

WHAT TO TRACK

Three rows with a missing month

VALIDATE THE RESULT

```
ValueError: Monthly coverage
is not consecutive
```

GUIDED PRACTICE

LEARNER PRACTICE

Guided practice

Operating cash flow is 90 and positive-outflow CapEx is 25. Compute FCF and explain the subtraction.

PREDICT · MODIFY · RUN

01 Restate the supplied rules.

02 Predict the result.

03 Modify and run the code.

04 Compare actual output.

05 Explain any difference.

INDEPENDENT PRACTICE

LEARNER PRACTICE

Independent practice

For [10,20,30,40], compute a three-observation rolling mean with min_periods=3.

PREDICT · MODIFY · RUN

01 Restate the supplied rules.

02 Predict the result.

03 Modify and run the code.

04 Compare actual output.

05 Explain any difference.

CHECK YOUR UNDERSTANDING

MENTAL MODEL

Check your understanding

Diagnostic: Does rolling(3) guarantee a three-calendar-month window? No. It ordinarily counts three observations.

RECAP AND NEXT STEP

Recap and next step

Separate profit from cash flow, subtract nonnegative CapEx outflows, and check entity boundaries and calendar coverage before rolling.

UNDERSTAND APPLY VALIDATE EXPLAIN