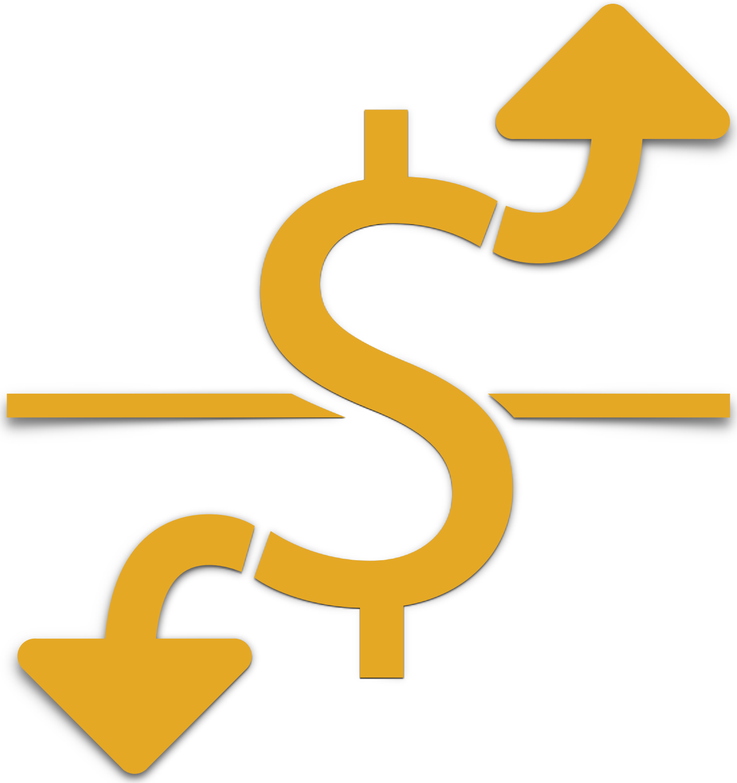
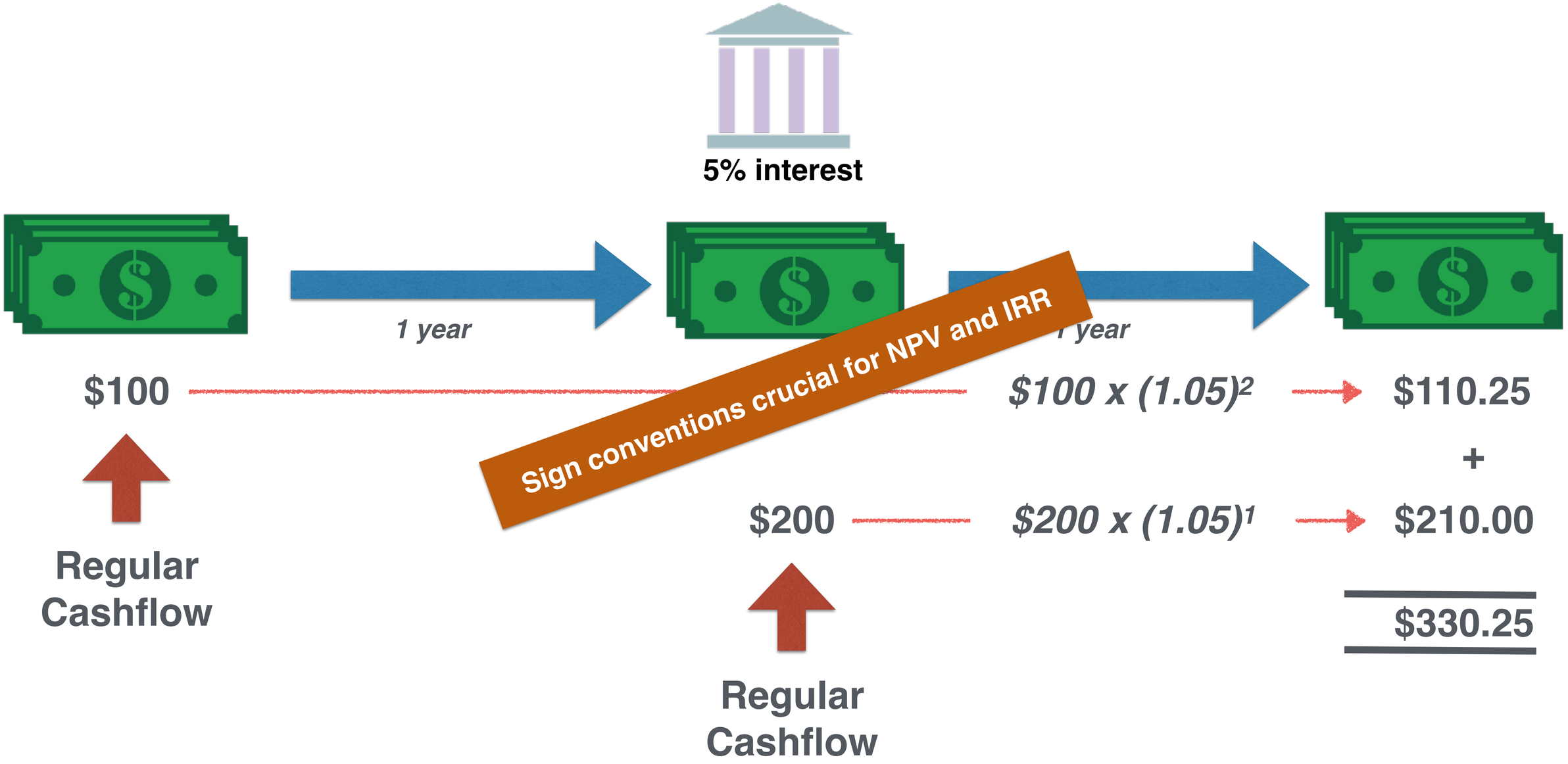


Discounted Cash Flow

NPV and IRR

1. Calculate NPV and IRR
2. Decision rules

PREP nuggets



PREP nuggets

NPV and IRR

1. Calculate NPV and IRR
2. Decision rules

1 year

1 year

$100 ——— $100 x (1.05)² → $110.25

+

$200 ——— $200 x (1.05)¹ → $210.00

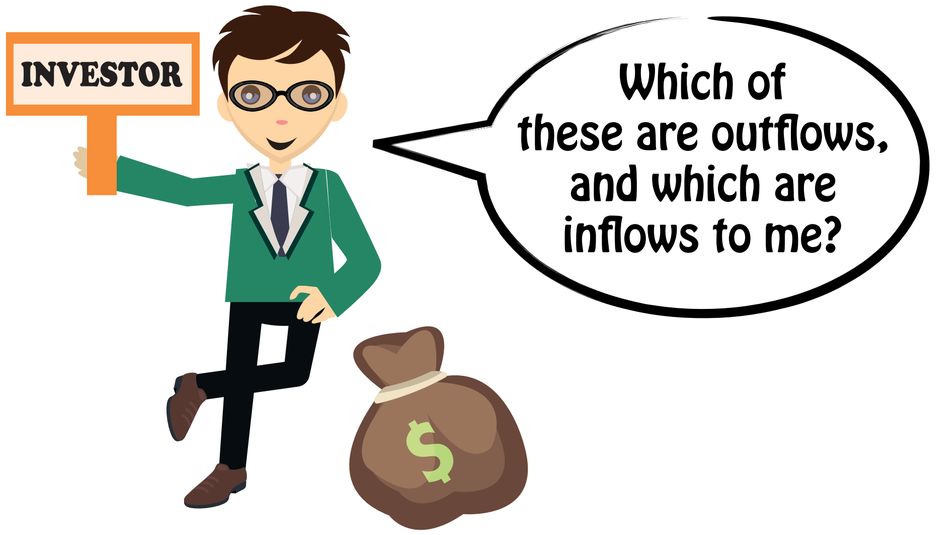
OUTFLOW

Regular Cashflow

OUTFLOW

Regular Cashflow

INFLOW $330.25



PREP nuggets

NPV and IRR

1. Calculate NPV and IRR

2. Decision rules

- $100

OUTFLOW

- $200

OUTFLOW

+ $330.25

INFLOW

PREP nuggets

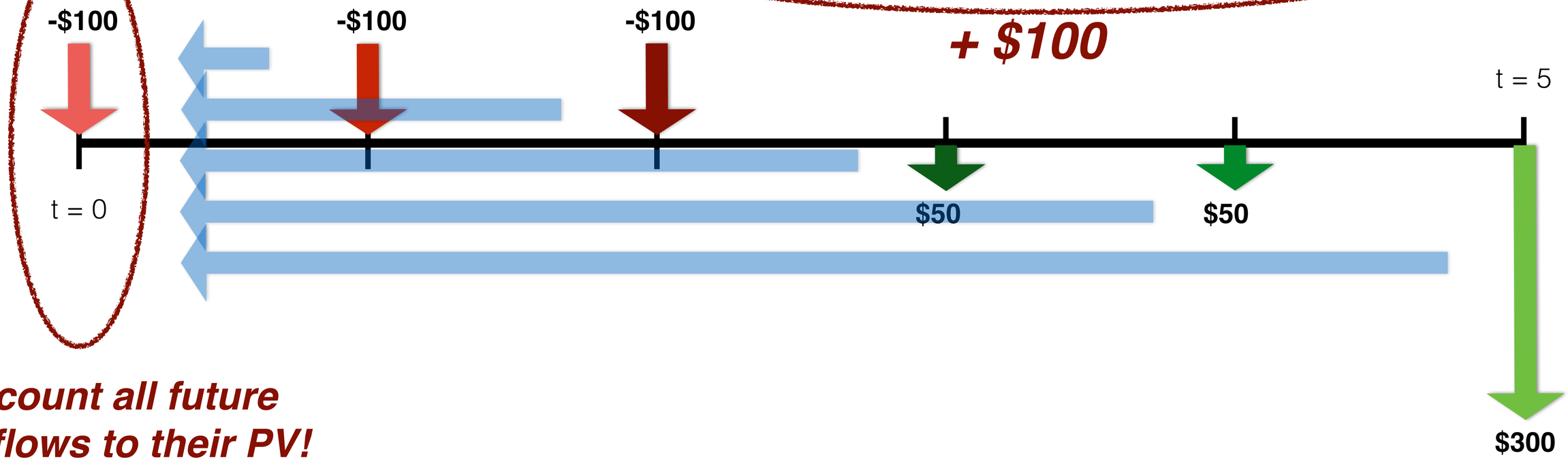
NPV and IRR

1. Calculate NPV and IRR
2. Decision rules

Alpha Project

- 5 years to complete
- Invest $100 per year for first 3 years
- Expected to receive $50 upfront at end of 3rd and 4th year
- Collect $300 upon completion

Total Invested: $300 **Total Returned: $400**



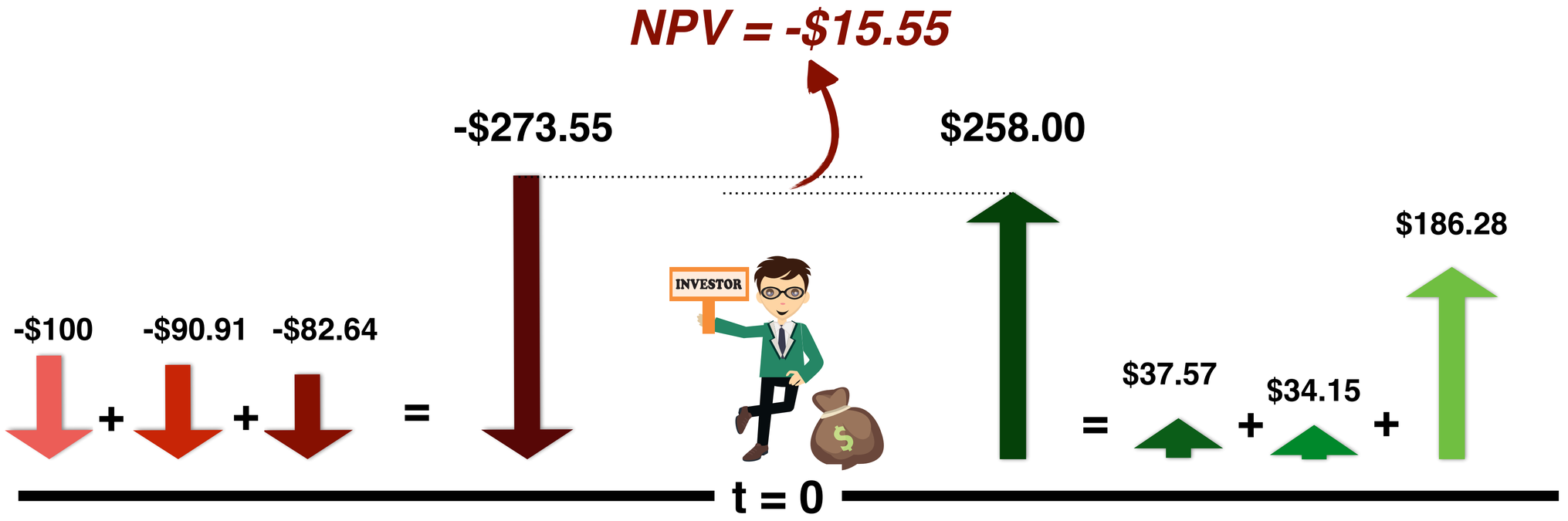
Discount all future cashflows to their PV!

PREP nuggets

NPV and IRR

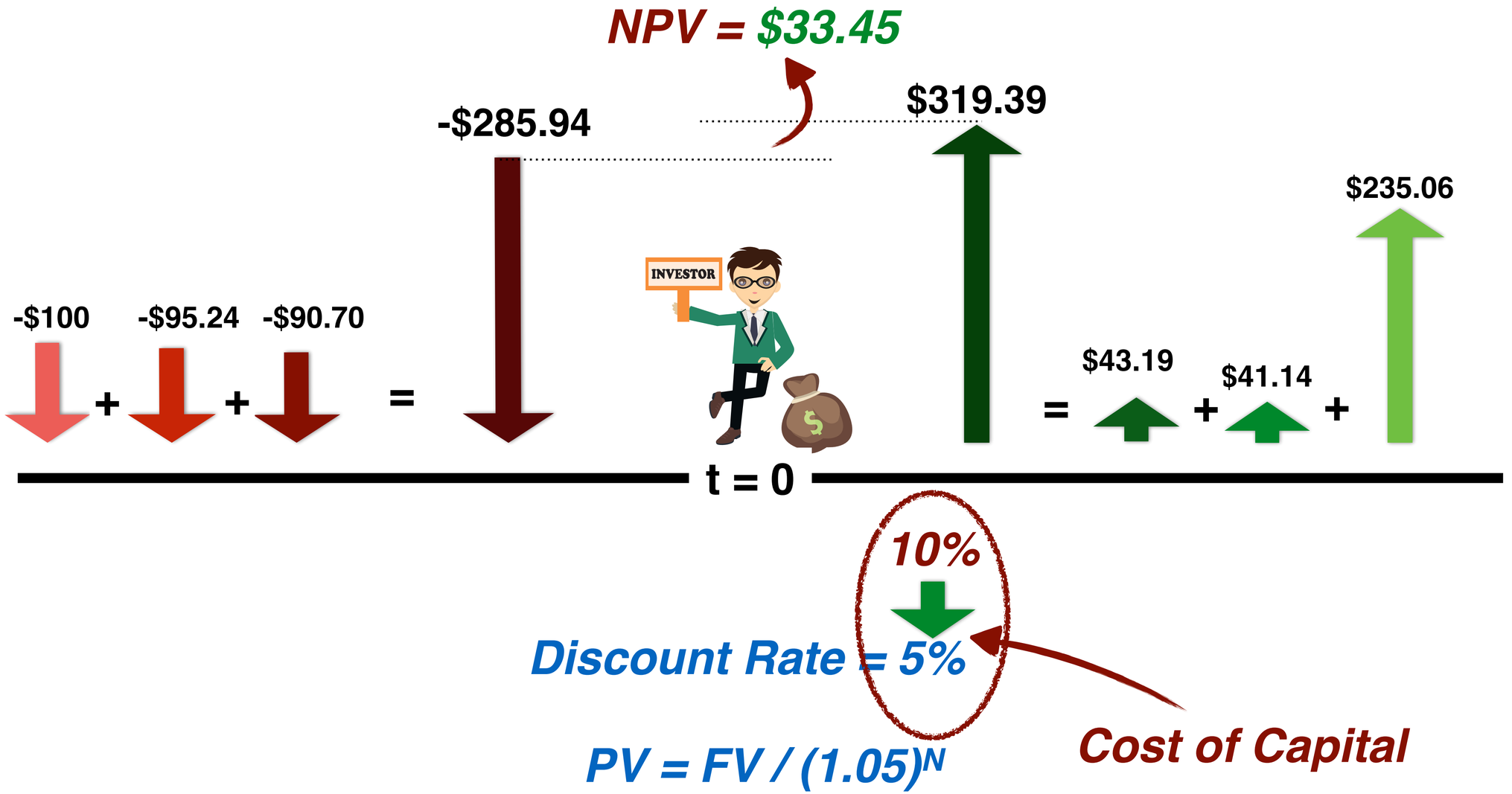
1. Calculate NPV and IRR

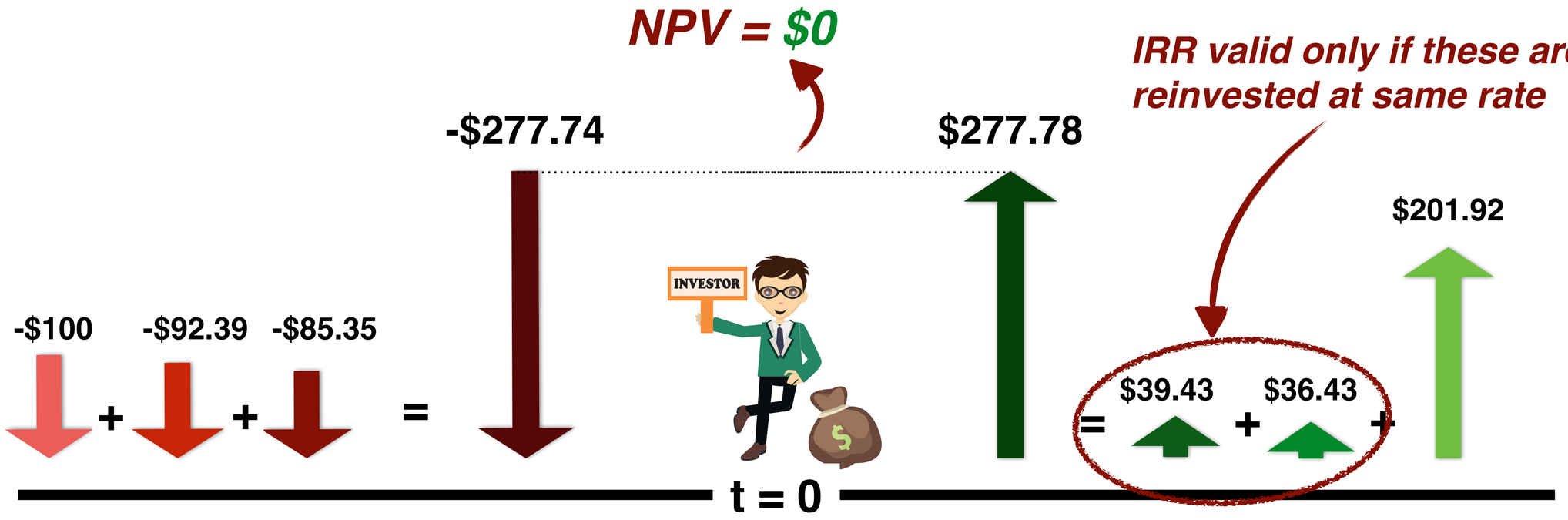
2. Decision rules



Discount Rate = 10%

$$PV = FV / (1.1)^N$$


NPV = $33.45
-$285.94
$319.39
$235.06
-$100
-$95.24
-$90.70
INVESTOR
$43.19
$41.14
t = 0
10%
Discount Rate = 5%
PV = FV / (1.05)^N
Cost of Capital



Internal Rate of Return!

Discount Rate = 8.24%

Discount rate that makes NPV=0

$$PV = FV / (1.0824)^N$$

Alpha Project

- 5 years to complete
- Invest $100 per year for first 3 years
- Expected to receive $50 upfront at end of 3rd and 4th year
- Collect $300 upon completion

Total Invested: $300 Total Returned: $400

NPV @5%: **$33.45** IRR: **8.24%**

Beta Project

- 8 years to complete
- Invest $1000 per year for first 2 years
- Invest $500 per year for subsequent 6 years
- Collect $1000 upfront payment at beginning of year 3
- Collect $5500 upon completion

Total Invested: $5000 Total Returned: $6500

NPV @5%: **$???** IRR: **???%**

PREP nuggets

NPV and IRR

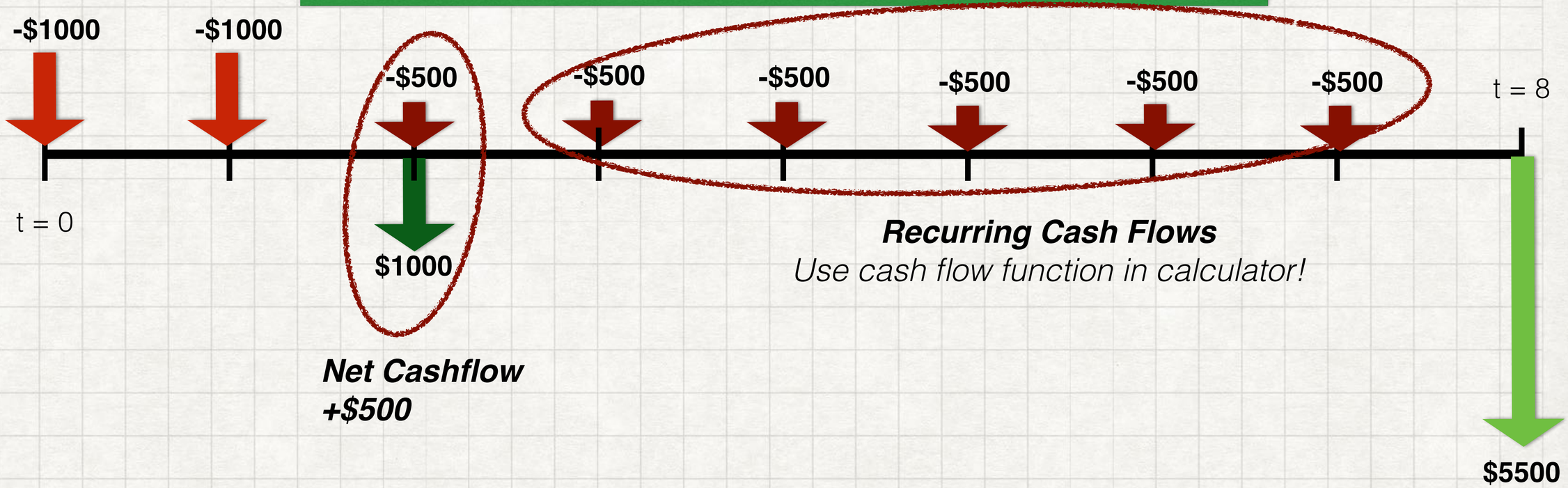
1. Calculate NPV and IRR
2. Decision rules

Beta Project

- 8 years to complete
- Invest $1000 per year for first 2 years
- Invest $500 per year for subsequent 6 years
- Collect $1000 upfront payment at beginning of year 3
- Collect $5500 upon completion

Total Invested: $5000 **Total Returned: $6500**

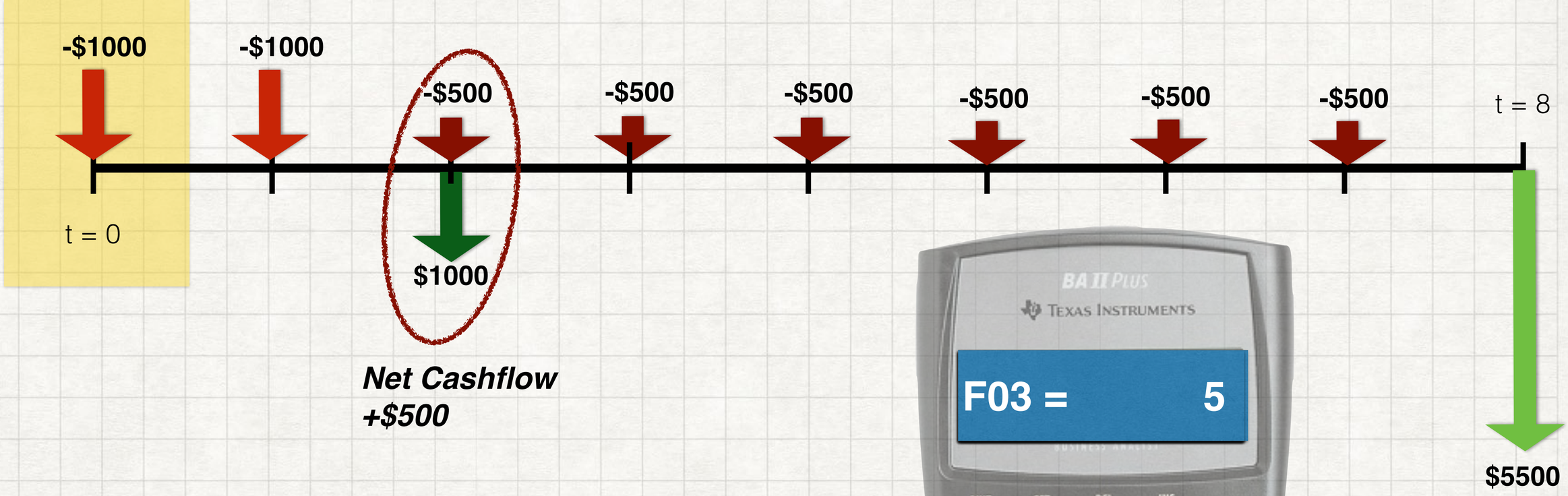
NPV @5%: **$???** IRR: **???%**



Recurring Cash Flows

Use cash flow function in calculator!

Net Cashflow
+$500



STEP 1 - Clear Memory

CF → 2ND CLR WORK

STEP 2 - Initial Cashflow CF0

-1000 ENTER → ↓

STEP 3 - C01=-1000, F01=1

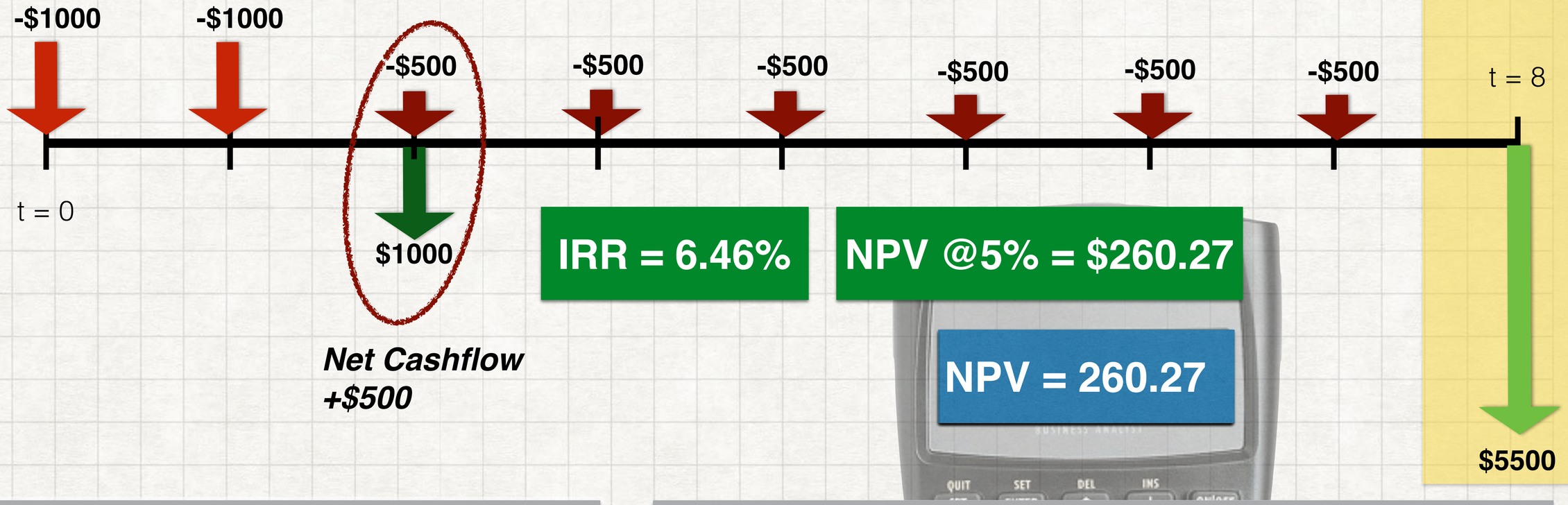
-1000 ENTER → ↓ → ↓

STEP 4 - C02=500, F02=1

500 ENTER → ↓ → ↓

STEP 5 - C03=-500, F03=5

-500 ENTER → ↓ → 5 ENTER → ↓



STEP 4 - C02=500, F02=1

500 → ENTER → ↓ → ↓

STEP 5 - C03=-500, F03=5

-500 → ENTER → ↓ → 5 → ENTER → ↓

STEP 6 - C04=5500

5500 → ENTER

STEP 7 - Compute IRR

IRR → CPT

STEP 8 - Compute NPV, I=5

NPV → 5 → ENTER → ↓ → CPT

Alpha Project

- 5 years to complete
- Invest $100 per year for first 3 years
- Expected to receive $50 upfront at end of 3rd and 4th year
- Collect $300 upon completion

Total Invested: $300 Total Returned: $400

NPV @5%: **$33.45** IRR: **8.24%**

Beta Project

- 8 years to complete
- Invest $1000 per year for first 2 years
- Invest $500 per year for subsequent 6 years
- Collect $1000 upfront payment at beginning of year 3
- Collect $5500 upon completion

Total Invested: $5000 Total Returned: $6500

NPV @5%: **$260.27** IRR: **6.46%**

PREP nuggets

NPV and IRR

1. Calculate NPV and IRR
2. Decision rules

Alpha Project	NPV @5%: **$33.45**	IRR: **8.24%**

Beta Project	NPV @5%: **$260.27**	IRR: **6.46%**

Decision Rules

Not Mutually Exclusive

May choose both projects

Mutually Exclusive

May choose at most one of the projects

PREP nuggets

NPV and IRR

1. Calculate NPV and IRR

2. Decision rules

Alpha Project NPV @5%: **$33.45** IRR: **8.24%** YES

Beta Project NPV @5%: **$260.27** IRR: **6.46%** YES

Decision Rules

Not Mutually Exclusive

NPV Rule
Choose projects with positive NPV

IRR Rule
Choose projects with IRR > required return

→ **Choose both Alpha and Beta**

Mutually Exclusive

PREP nuggets

NPV and IRR

1. Calculate NPV and IRR

2. Decision rules

Alpha Project	NPV @5%: **$33.45**	IRR: **8.24%**
Beta Project	NPV @5%: **$260.27**	IRR: **6.46%**

Beta* has potential to increase wealth by greater amount than *Alpha

NO!

YES

Decision Rules

Not Mutually Exclusive

NPV Rule
Choose projects with positive NPV

IRR Rule
Choose projects with IRR > required return

→ **Choose both Alpha and Beta**

Mutually Exclusive

NPV Rule
Choose project with higher NPV

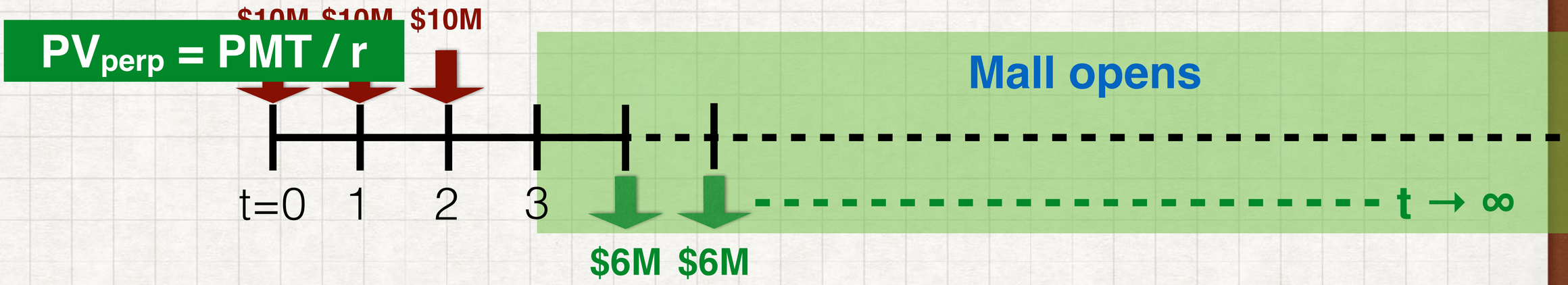
→ **Choose BETA!**

PREP nuggets

NPV and IRR

1. Calculate NPV and IRR
2. Decision rules

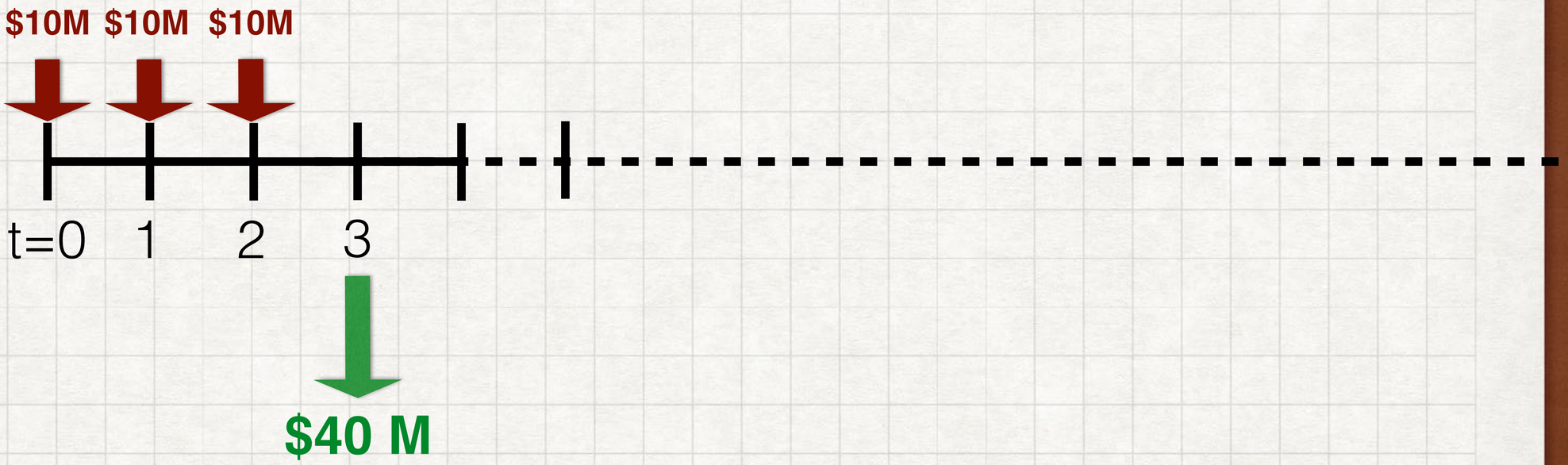
A project to build a shopping mall requires a capital outlay of $10 million for each of the first 3 years. Upon completion of the mall in the beginning of the fourth year, the project is expected to bring in $6 million per year in perpetuity. If the developer's cost of capital is 15%, determine if it should proceed with the project.



$$PV_{perp} = PMT / r$$

$$PV_3 = \$6M / 0.15$$
$$= \$40\ M$$

A project to build a shopping mall requires a capital outlay of $10 million for each of the first 3 years. Upon completion of the mall in the beginning of the fourth year, the project is expected to bring in $6 million per year in perpetuity. If the developer's cost of capital is 15%, determine if it should proceed with the project.



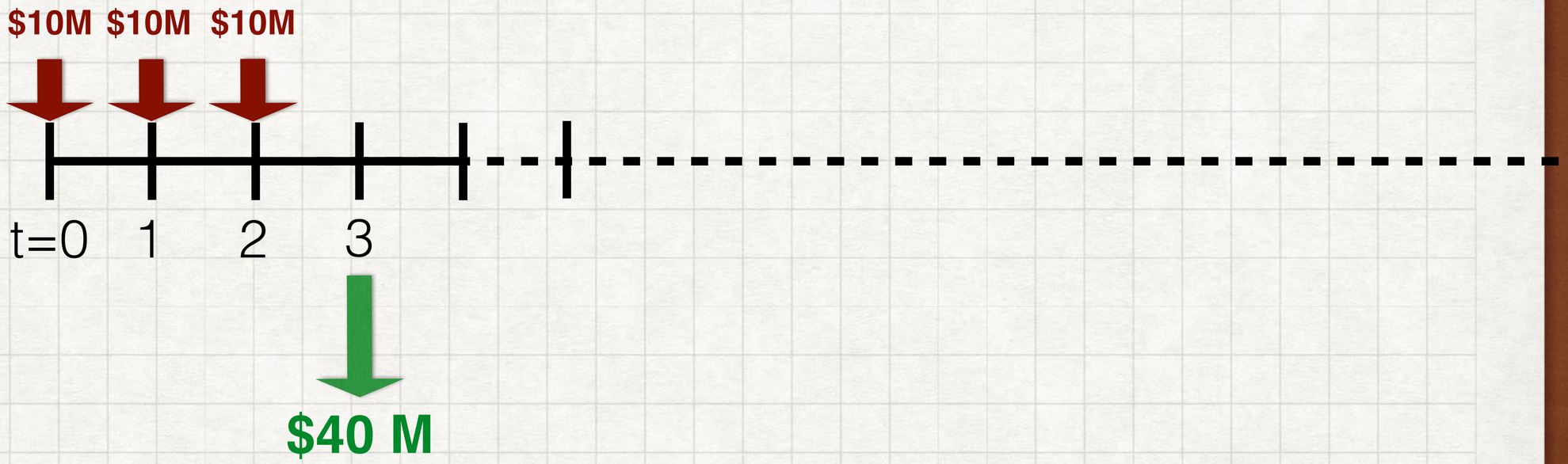
STEP 1 - Clear Memory

CF → 2ND CLR WORK

STEP 2 - Initial Cashflow CF0

-10 ENTER → ↓

A project to build a shopping mall requires a capital outlay of $10 million for each of the first 3 years. Upon completion of the mall in the beginning of the fourth year, the project is expected to bring in $6 million per year in perpetuity. If the developer's cost of capital is 15%, determine if it should proceed with the project.



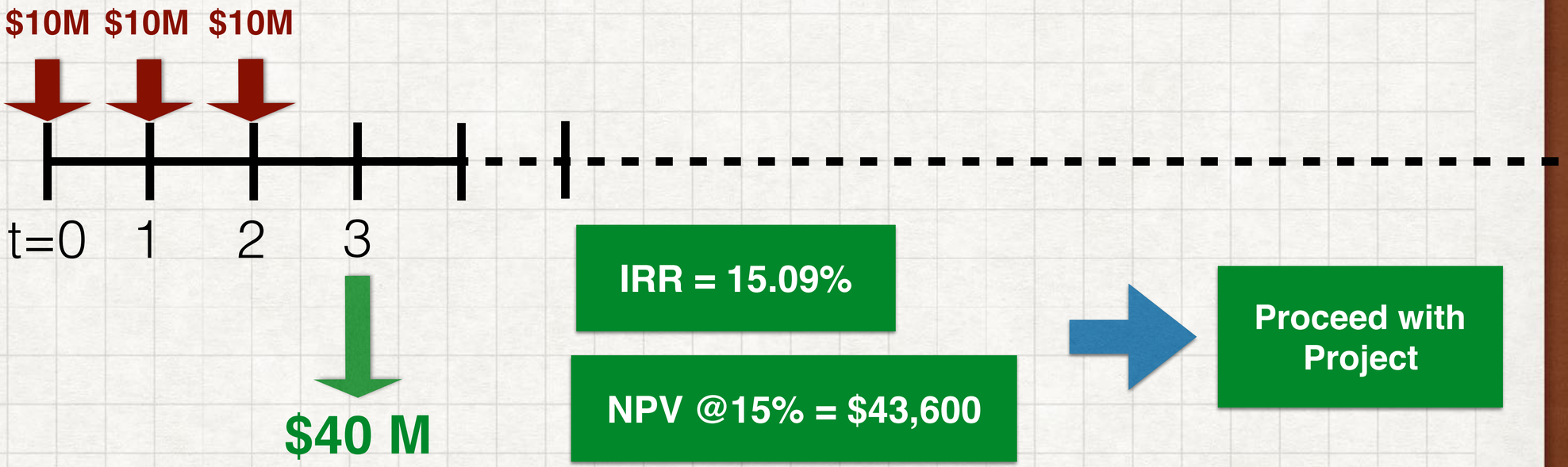
STEP 3 - C01=-10, F01=2

-10 ENTER → ↓ → 2 ENTER → ↓

STEP 4 - C02=40

40 ENTER

A project to build a shopping mall requires a capital outlay of $10 million for each of the first 3 years. Upon completion of the mall in the beginning of the fourth year, the project is expected to bring in $6 million per year in perpetuity. If the developer's cost of capital is 15%, determine if it should proceed with the project.



IRR = 15.09%

NPV @15% = $43,600

Proceed with Project

STEP 5 - Compute IRR

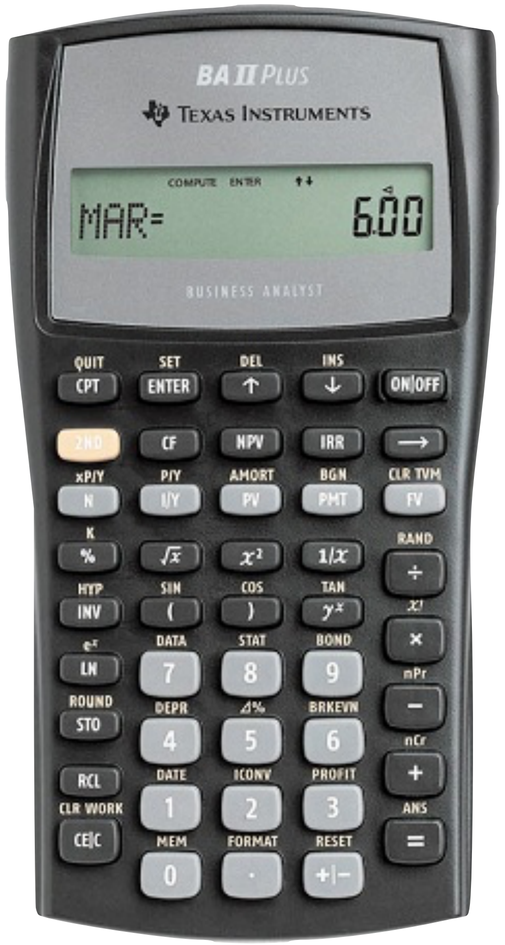
IRR → CPT

OR

STEP 5 - Compute NPV, I=15

NPV → 15 ENTER → ↓ → CPT

1. Calculate NPV and IRR



STEP 1 - Clear Memory

CF → 2ND CLR WORK

↓

Key in all Cashflows

↓

Compute IRR

IRR → CPT

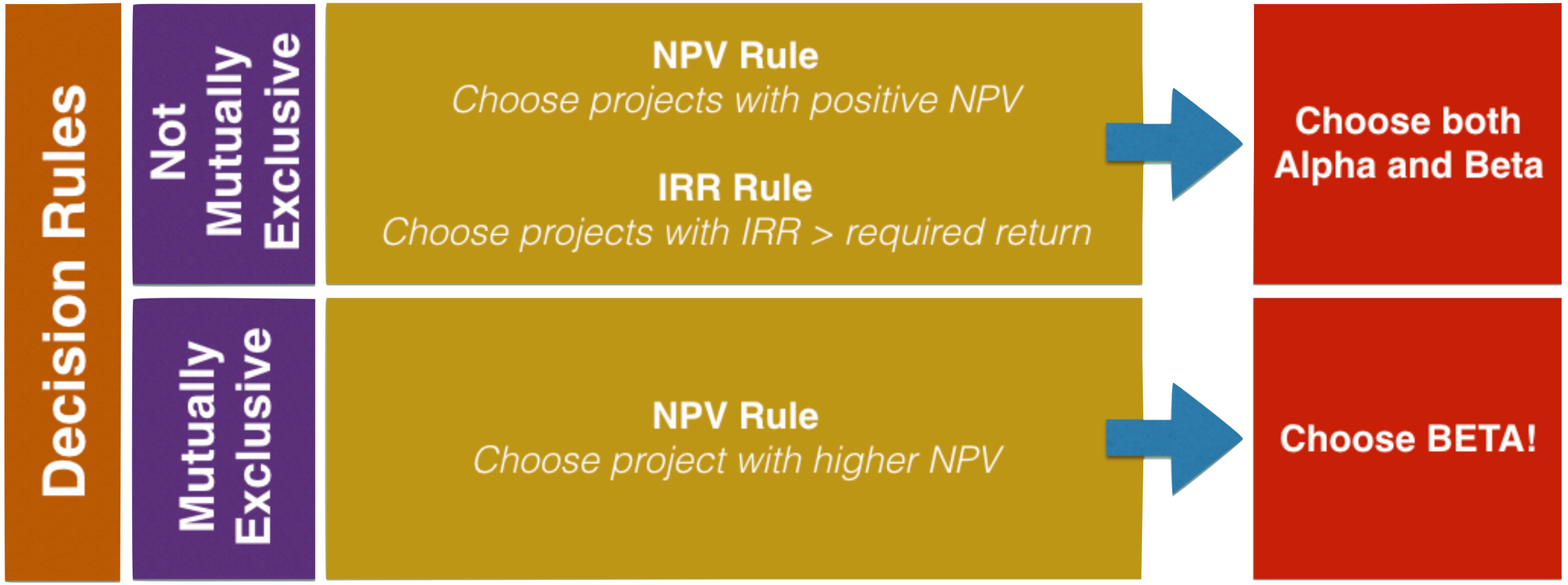
OR

Compute NPV

NPV → xx ENTER → ↓ → CPT

PREP nuggets

2. Decision rules



PREP nuggets