# 📘 User Manual: Investment Metrics Explained

## Net Present Value (NPV)

💰 Think of NPV as: “How much is this stream of future profits worth today?”  
  
When:  
• NPV > 0 → the investment is profitable  
• NPV = 0 → the IRR is the return rate  
• NPV < 0 → you’re losing money  
  
📊 Formula:  
NPV = ∑ CFₜ / (1 + r)ᵗ - Initial Investment

## Internal Rate of Return (IRR)

📈 Definition: Annualized return rate where NPV = 0  
  
🔢 Formula:  
Use numpy or a financial calculator:  
np.irr([-Initial Investment, CF1, CF2, ...])

## Return on Investment (ROI)

📊 Definition: Total return relative to initial capital.  
  
💡 Formula:  
ROI = (Total Return / Initial Investment) × 100  
  
ROI becomes more meaningful over time as it includes:  
• Appreciation  
• Mortgage principal paydown  
• Net profit at sale

## Cash-on-Cash Return (CoC)

💸 Definition: Measures the annual pre-tax cash flow relative to the initial cash invested.  
  
💡 Formula:  
CoC = (Annual Pre-Tax Cash Flow / Initial Cash Invested) × 100  
  
🧮 Example:  
You put $40,000 down on a rental property and receive $3,600 in annual cash flow:  
CoC Return = ($3,600 / $40,000) × 100 = 9%

## Multi-Year Cash Flow & ROI

📆 Cash Flow = Annual Rent – (Operating Expenses + Mortgage Payments)  
ROI = (Total Return / Initial Investment) × 100

## 🧾 What Counts as Cash Flow for CoC and ROI?

Cash-on-Cash Return uses Net Pre-Tax Cash Flow — not total rent.  
  
📊 Formula:  
Cash Flow = Annual Rent – (Operating Expenses + Mortgage Payments)  
  
In many cases, Operating Expenses (property taxes, insurance, repairs, etc.) are estimated or entered manually in the app.  
If you only know mortgage and rent, use a placeholder for expenses, e.g., 25% of rent.  
  
💡 Tip: If you’re unsure of the exact monthly expenses, a common rule of thumb is to estimate them as 25% of monthly rent.  
This includes typical operating costs like:  
• Property taxes  
• Insurance  
• Repairs & maintenance  
• Vacancy buffer  
• HOA fees or other recurring expenses

## 🎯 When CoC = ROI (Year 1)

If there is no appreciation, mortgage paydown, or sale value yet, ROI = CoC.  
  
But ROI becomes more powerful long-term, factoring in gains like:  
• Equity from price appreciation  
• Mortgage principal reduction  
• Sale value of property