

# In-Class Activity: TBM1 — Liquidation Math

Digital Finance – BSc Course

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Trustless Business Models | 15–18 min | Groups of 3–4

**Context:** In DeFi lending (Aave, Compound), overcollateralization replaces credit scoring. A borrower posts more collateral than they borrow; smart contracts auto-liquidate if the collateral ratio falls below a threshold. This worksheet drills the arithmetic you need to size a position safely. **Starting position:** 5 ETH at \$3,200 collateral; borrowed \$8,000 USDC; liquidation at ratio = 125%; liquidation penalty 8%; gas per tx \$18.

**Exercise 1: Collateral Ratio Under Shocks** Compute the collateral ratio at each ETH price below and mark SAFE / LIQUIDATED. Ratio = (ETH × price) / debt.

| Scenario | ETH Price | Collateral Value | Ratio (%) | SAFE / LIQUIDATED |
|----------|-----------|------------------|-----------|-------------------|
| A        | \$3,200   |                  |           |                   |
| B        | \$2,600   |                  |           |                   |
| C        | \$2,200   |                  |           |                   |
| D        | \$1,900   |                  |           |                   |
| E        | \$1,600   |                  |           |                   |

**Exercise 2: Pick a Liquidation-Avoidance Strategy** At scenario C (ETH = \$2,200) you are still safe but close. You have \$2,000 free USDC and 0.5 ETH in a wallet. Which single move best protects you if ETH drops another 15%? Show the resulting ratio for each option and circle the winner.

| Option | Action                 | Ratio after move @ \$2,200 | Ratio after another -15% |
|--------|------------------------|----------------------------|--------------------------|
| (i)    | Do nothing             |                            |                          |
| (ii)   | Add 0.5 ETH collateral |                            |                          |
| (iii)  | Repay \$2,000 USDC     |                            |                          |

**Exercise 3: Effective APR After Gas & Liquidation Risk** Suppose the stated borrow APR is 5.0%. You borrow for 30 days and execute 4 on-chain transactions (1 open, 2 rebalances, 1 close) at \$18 gas each. If you are liquidated once during the month, add the 8% liquidation penalty on the \$8,000 debt. Compute the **effective** 30-day cost in dollars and the **annualised** effective rate with and without a liquidation event.

**Debrief:** How does the effective APR compare with a traditional bank loan at 6–9%? When would a rational borrower still choose DeFi?