Part I: Simple Interest Problems

Problem 1

Given: $P = \$8{,}400$, $r = 6.5\% = 0.065$, $t = 8/12$ years

Calculation: $I = 8{,}400 \times 0.065 \times (8 / 12) = \$364.00$

Interest Owed at Maturity: $364.00

Problem 2

Given: $P = \$22{,}000$, $r = 4.25\% = 0.0425$, $t = 146 / 365$ years

Calculation: $I = 22{,}000 \times 0.0425 \times (146 / 365) = \$374.00$

Interest Earned: $374.00

Problem 3

Given: $P = \$5{,}750$, $r = 9\% = 0.09$, $t = 2.5$ years

Calculations:

• Interest: $I = 5{,}750 \times 0.09 \times 2.5 = \$1{,}293.75$

• Maturity Value: $S = 5{,}750 + 1{,}293.75 = \$7{,}043.75$

Interest: $1,293.75 | **Maturity Value: $7,043.75**

Problem 4

Given: $I = \$630$, $r = 7\% = 0.07$, $t = 15/12 = 1.25$ years

Calculation: $P = I / (r \cdot t) = 630 / (0.07 \times 1.25) = \$7{,}200.00$

Principal: $7,200.00

Problem 5

Given: $S = \$9{,}579.50$, $r = 5.5\% = 0.055$, $t = 9/12 = 0.75$ years

Calculation: $P = S / (1 + r \cdot t) = 9{,}579.50 / (1 + 0.055 \times 0.75) = 9{,}579.50 / 1.04125 = \$9{,}200.00$

Original Deposit: $9,200.00

Problem 6

Given: $P = \$12{,}000$, $I = \$450$, $days = 180$

• **365-day basis:** $r = 450 / (12{,}000 \times (180 / 365)) \approx 7.60\%$

• **360-day basis:** $r = 450 / (12{,}000 \times (180 / 360)) = 7.50\%$

Annual Interest Rate: 7.60% (exact / 365-day) or **7.50%** (ordinary / 360-day)

Problem 7

Given: $P = \$3{,}500$, $S = \$3{,}720.50 \Rightarrow I = \$220.50$, $t = 14/12$ years

Calculation: $r = 220.50 / (3{,}500 \times (14 / 12)) = 0.054 = 5.4\%$

Annual Interest Rate: 5.4%

Problem 8

Given: $P = \$6{,}000$, $I = \$160$, $r = 8\% = 0.08$

Calculation: $t = 160 / (6{,}000 \times 0.08) = 160 / 480 = 1/3$ year

• 365-day basis: $(1/3) \times 365 = 121.67 \approx 122$ days

• 360-day basis: $(1/3) \times 360 = 120$ days

Time Required: 122 days (365-day basis) or **120 days** (360-day basis)

Problem 9

Given: $I = \$652.50$, $P = \$14{,}500$, $r = 6\% = 0.06$

Calculation: $t = 652.50 / (14{,}500 \times 0.06) = 652.50 / 870 = 0.75$ years

Convert to months: $0.75 \times 12 = 9$ months

Loan Duration: 9 months

Problem 10

Given: $P = \$45{,}000$, $r = 7.2\% = 0.072$, $days = 200$

• **360-day basis (Ordinary):** $I = 45{,}000 \times 0.072 \times (200 / 360) = \$1{,}800.00$

• **365-day basis (Exact):** $I = 45{,}000 \times 0.072 \times (200 / 365) = \$1{,}775.34$

• Difference: $\$1{,}800.00 - \$1{,}775.34 = \$24.66$

Interest (360-day): $1,800.00 | **Interest (365-day): $1,775.34**
Value of convention to lender: $24.66 extra

Part II: Face Value, Discount, and Proceeds

Problem 11

Given: $F = \$24{,}000$, $d = 8\% = 0.08$, $t = 120 / 360$ years

• Discount: $D = 24{,}000 \times 0.08 \times (120 / 360) = \$640.00$

• Proceeds: $P = 24{,}000 - 640 = \$23{,}360.00$

Discount: $640.00 | **Proceeds: $23,360.00**

Problem 12

Given: $F = \$9{,}600$, $d = 6.5\% = 0.065$, $t = 75 / 360$ years

• Discount: $D = 9{,}600 \times 0.065 \times (75 / 360) = \$130.00$

• Proceeds: $P = 9{,}600 - 130 = \$9{,}470.00$

Discount: $130.00 | **Proceeds: $9,470.00**

Problem 13

Given: $P = \$18{,}000$, $d = 7\% = 0.07$, $t = 180 / 360 = 0.5$ years

Calculation: $F = P / (1 - d \cdot t) = 18{,}000 / (1 - 0.07 \times 0.5) = 18{,}000 / 0.965 = \$18{,}652.85$

Required Face Value: $18,652.85

Problem 14

Given: $F = \$30{,}000$, $P = \$29{,}475 \Rightarrow D = \$525$, $t = 90 / 360 = 0.25$ years

Calculation: $d = D / (F \cdot t) = 525 / (30{,}000 \times 0.25) = 525 / 7{,}500 = 0.07 = 7\%$

Discount Rate Used: 7.0%

Problem 15

Given: $F = \$16{,}000$, $d = 9\% = 0.09$, $D = \$360$

Calculation: $t = D / (F \cdot d) = 360 / (16{,}000 \times 0.09) = 360 / 1{,}440 = 0.25$ years

• On a 360-day basis: $0.25 \times 360 = 90$ days

• On a 365-day basis: $0.25 \times 365 = 91.25$ days

Time Note Discounted: 90 days (commercial 360-day basis)