1. 10M shares outstanding at $20/share

$D = 200M$ $(r_f = 0.03)$, reduce D/V to 0.2 issuing $\uparrow E$ & $\downarrow D$

β_E before $= 0.8$ Mkt risk premium 5% $\beta_D = 0.23$

(a) In M&M, the value of firm does not depend on choice of capital structure, so the value does not change before & after restructuring

∴ $V_U = V_L = E + D = 20 \times 10 + 200 = \$400M$

(b) Before = $D/V = 200/400 = 0.5$ $r_E = r_f + \beta_E \times 0.05 = 0.07$

$r_A = 0.5 \times 0.03 + 0.5 \times 0.07 = 0.0575$ (not changed) $r_{D_{old}} = 0.03 + 0.23 \times 0.05 = 0.0415$

(0.0415)

Because value unchanged, $D_{new}/V = 0.2 \rightarrow D_{new} = 0.2 \times 400 = 80$ ∴ buy back $D = 120$

$P_{new} = \dfrac{E_{new}}{\#s\, out} = \dfrac{200 + 120}{10M + I} = \dfrac{120}{I}$ ∴ $320 I = 1200 + 120 I$ $200 I = 1200$ $I = 6$

$P_{new} = 20$

(c) Before: $\beta_E = 0.8$, $r_E = 0.07$

$D/D+E = 0.2$ $E/D+E = 0.8$ ∴ $D/E = \frac{1}{4}$ $r_{D_{new}} = 0.03$

After: $r_{E_{new}} = 0.0575 + \frac{1}{4}(0.0575 - 0.03) = 0.0621875$

$r_{E_{new}} = 0.0621875 = 0.03 + \beta_{E_{new}} \times 0.05 \Rightarrow \beta_{E_{new}} = 0.64375$

(d) relever in personal account → that is to use short debt to buy more equity

2. $E = \$45M$ (IM $ shares out)

$D = \$10M$ perpetual, risk free $r_{mkt} = 0.08$

$CF = 10$, perpetuity (starting $n = 1$)

a. $V = \dfrac{C}{r_A} \rightarrow 45 + 10 = \dfrac{10}{r_A}$ $r_A = 0.1818182$

b. $r_D = r_f = 0.02$

c. $r_E = r_A + \dfrac{D}{E}(r_A - r_D) = 0.1818182 + \dfrac{10}{45}(0.1818182 - 0.02 = 21.77778$

d. $EPS = \dfrac{EBIT - interest\, pay}{\#\, out} = \dfrac{10 - 10 \times 0.02}{1} = 9.8$

e. In M&M, r_A stays same at 0.1818182, value is still 55

$\therefore D/V_{new} = 0.1 \longrightarrow D = 5.5$ still $r_{D_{old}} = r_{D_{new}}$, because unlevering will not increase riskiness of debt

3. $P_{old} = \$10$, 20M shares out   no debt

$\tau_C = 0.35$ borrowing cost $= 0.05$ perpetual debt

a. $P_{new} = \dfrac{E_{new}}{\#out} = \dfrac{20 \times 10 + 0.35 \times 50 - 50}{20 - R} = \dfrac{50}{R}$ $167.5R + 50R = 1000$

$R = 4.5977$

b. $P_{new} = \dfrac{50}{4.5977} = 10.875$

c. $PV(DTS) = \tau_C \cdot D = 0.35 \times 50 = 17.5$ (in total) per share post-restructuring: $17.5/(20 - 4.5977) = 1.1362/share$

d. $\tau^* = 1 - \dfrac{0.65 \times 0.9}{0.7} = 0.164286$ $PV(DTS) = 0.164286 \times 50 = 8.2143$