a) $E(R_i) = r_f + \beta_e \cdot (E(R_m) - r_f)$

$E(R_i) = \underline{12\%}$

Under MM, WACC is independent of company capital structure

$$\Rightarrow r_{wacc} = \frac{E}{E+D} \cdot \underline{12\%} + \frac{D}{D+E} \cdot 8\%$$

$D = 4M$

$E = 100\,000 \times 80 = 8000\,000$

$$r_{wacc} = \frac{1}{2} \cdot 12\% + \frac{1}{2} \cdot 8\% = 10{,}67\%$$

b) We suppose the investment is carrying the same risk as the current company, we will discount the project using the WACC

$$NPV = -950\,000 + \frac{1\,100\,000}{1 + 10{,}6\%} = 43\,976$$

NPV is positive, the company should undertake the investment.

c) First proposition states that the cost of capital is not dependent of the capital structure of the company if there is no taxes, market are efficient and complete.

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The reason comes from the second proposition that states that cost of equity increases with the increase of debt ratio => this is because more debt implies more risk for the shareholders in case of bankruptcy (debtholders comes first).

MM says that these two effects will offset each other st even if debt is cheaper, the increase of cost of equity will force WACC to remain constant.

From CAPM, we recall that $\beta_P = \sum_{i=1}^{n} x_i \cdot \beta_i$.

This could be applied to our calculation:

$$\frac{E}{E+D} \cdot \beta_e + \frac{D}{E+D} \cdot \beta_D = \underbrace{\beta_U = \beta_A}_{\text{does not change with capital structure}}$$

Based on that, β_e will increase too after issuing more debt.

d) WACC in a context of taxes changes:

$$WACC_{taxes} = \frac{E}{E+D} \cdot r_e + \frac{D}{D+E} \cdot r_d (1-t)$$

We can see that it decreases because of the tax shield. There is an incentive for companies to finance themselves using debt up to a certain point because of the risk of financial distresses and costs...