3.

$$q\,u\left[(1+R_1)A + w - A\right] + (1-q)\,u\left[(1+R_0)A + w - A\right]$$

$$U(x) = \ln(x)$$

$U'(x) = 0$
w.r.t. A

$$q\,\frac{R_1}{R_1 A + w} + (1-q)\,\frac{R_0}{R_0 A + w} = 0$$

or $\quad A = -w\left[\dfrac{qR_1 + (1-q)R_0}{R_0 R_1}\right] \quad — (1)$

Given : $q = 0.4$

$R_1 = 5\%$

$1-q = 0.6$

$R_0 = -1\%$

Putting the values in eqn. (1) we get

4

$$A = 28\,w$$

1

As wealth increases, the investor puts more of his portfolio into the equity fund.

3.2

$$U(x) = -e^{-x}$$

Max. $U(x)$ w.r.t. A

we get

$$R_1 q e^{-(R_1 A + w)} + R_0 (1-q) e^{-(R_0 A + w)} = 0$$

$$A = \frac{1}{R_0 - R_1} \ln\left[- \frac{R_0 (1-q)}{R_1 q} \right]$$

4

$$A = \frac{1}{(-1\% - 5\%)} \ln\left[\frac{1\% \times 0.6}{5\% \times 0.4} \right]$$

$$A = 20.07$$

+1

A does not change with w.

The investment in risky asset does not change with w.

There is no relationship between A and w.

4.4. Let $\bar{\omega}$ be the weight matrix

4 marks total.

$$\bar{\omega} = \begin{bmatrix} \omega \\ \omega \\ \omega \end{bmatrix}_{3\times 1}$$

Objective function:-

* $\bar{\omega}^T \Sigma \bar{\omega}$ where Σ is var-covariance matrix

s.t.

* $\bar{\omega}^T I = 1$ where $I = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}_{3\times 1}$

* $\bar{\omega}^T R \geq 20\%$
  or =

* $\boxed{\omega\text{'s} \geq 0 \text{ if no short selling}}$

Even if not mentioned it is fine