Q1. Consider following two mutually exclusive projects.
1) What are the NPV for both projects with 8% required rate of return? What is the Excel formula for computing the IRR for the projects?
2) What is the Excel formula for computing the cross-over rate for the project?
3) Which project would you choose if the cross-over rate is 5.89% and the required rate of return is 8%?

Year	Project A	Project B	Difference
0	-21,000	-10,500	-10,500
1	4,000	2,500	1,500
2	7,500	3,800	3,700
3	8,200	3,600	4,600
4	6,300	3,900	2,400

$$NPV_{Project\ A} = -21,000 + \left(\frac{4,000}{1.08}\right) + \frac{7,500}{(1.08)^2} + \frac{8,200}{(1.08)^3} + \frac{6,300}{(1.08)^4} = 273.86$$

$$NPV_{Project\ B} = -10,500 + \left(\frac{2,500}{1.08}\right) + \frac{3,800}{(1.08)^2} + \frac{3,600}{(1.08)^3} + \frac{3,900}{(1.08)^4} = 797$$

=IRR({-21000,4000,7500,8200,6300}) = 8.55%
=IRR({-10500,2500,3800,3600,3900}) =11.16%

o Compute the differences of cash flows between project A and project B, which are -10500, 1500, 3700, 4600, 2400
o Incremental IRR/Cross-over rate: =IRR({-10500,1500,3700,4600,2400})
o The sum of cash flows for A is -21000+4000+7500+8200+6300=5000, for B is 10500+2500+3800+3600+3900=3300; Project A did well for low required rate. Project B did well for high required rate.
o Since the required rate of return is 8% > cross–over rate, we choose Project B

Q2. An investment provides you with four annual cash flows of 400 starting in year 3. If you require 5% return on your funds what is the present value of these cash flows? What is the net present value of the investment if the project requires an initial cost of 1000, is it worth investing?

$$PV = \frac{400}{(1+0.05)^3} + \frac{400}{(1+0.05)^4} + \frac{400}{(1+0.05)^5} + \frac{400}{(1+0.05)^6} = 1286.5127$$

- Alternatively

- $PV(at\ t = 2) = \frac{400}{0.05} \times \left(1 - \frac{1}{(1.05)^4}\right) = 1,418.38$

- $PV(at\ t = 0) = \frac{1,418.38}{(1+0.05)^2} = 1286.5127$

- $NPV = 1286.5127 - 1000 = 286.5127 > 0$ Yes, it is worth investing

Q3. The Sisyphean Company is planning on investing in a new project. This will involve the purchase of some new machinery costing $450,000. The Sisyphean Company expects cash inflows from this project as detailed below

Year One	Year Two	Year Three	Year Four
$200,000	$225,000	$275,000	$200,000

The appropriate discount rate for this project is 16%.

What is the NPV for this project?

- NPV = -450000 + 200000/(1.16)^1 + 225000/(1.16)^2 + 275000/(1.16)^3 + 200000/(1.16)^4 = 176,265

Q5. Consider the following two mutually exclusive projects:

Whichever project you choose, if any, you will require a 15% return on your investment.

1. If you apply the payback criterion, which project will you choose?

2. If you apply the NPV criterion, which project will you choose?

3. What is the NPV for Project A when the discount rate is 28%, what is its NPV when the discount rate is 26%. And then use Trial and Error to estimate its IRR for project A.

Year	Cash flow (A)	Cash flow (B)
0	-252,000	-24,000
1	18,000	14,400
2	36,000	12,600
3	38,400	11,400
4	510,000	9,800

The payback period for each project is:

A: $3 + (£159,600/£510,000) = 3.31$ years

B: $1 + (£9,600/£12,600) = 1.76$ years

Choose project B based on payback period rule

The NPV for each project is:

A: NPV $= -252,000 + 18,000/1.15 + 36,000/1.15^2 + 38,400/1.15^3 + 510,000/1.15^4 = 107,716.12$

B: NPV $= -24,000 + 14,400/1.15 + 12,600/1.15^2 + 11,400/1.15^3 + 9,800/1.15^4 = 11,148.02$

NPV criterion implies we accept project A because project A has a higher NPV than project B.

For Project A, NPV (@ 28%) = -7664.49

NPV (@ 26%) =6500.75

IRR can be estimated as

$\frac{IRR-26\%}{28\%-26\%} = \frac{0-6500.75}{-7664.49-6500.75}$ IRR is 26.92%