Question 1
L2R23TB-AC035-1512
LOS: LOS-7400
Lesson Reference: Lesson 4: Other Income Measures and Valuation Models
Difficulty: medium
When using claims valuation, the analyst will *most likely* estimate the cash flows accruing to stockholders and the cash flows accruing to bondholders and then:

- (●) discount these cash flows at the firm's cost of equity and cost of debt, respectively.
- ( ) discount these cash flows at the firm's cost of equity and after-tax cost of debt, respectively.
- ( ) calculate a weighted average cash flow and discount this cash flow by the firm's weighted average cost of capital.

Rationale
✔ **discount these cash flows at the firm's cost of equity and cost of debt, respectively.**
When applying claims valuation, cash flows accruing to the stockholders are discounted at the firm's cost of equity and cash flows accruing to the bondholders are discounted at the yield-to-maturity of the firm's debt.

Rationale
✘ **discount these cash flows at the firm's cost of equity and after-tax cost of debt, respectively.**
When applying claims valuation, cash flows accruing to the stockholders are discounted at the firm's cost of equity and cash flows accruing to the bondholders are discounted at the yield-to-maturity of the firm's debt.

Rationale
✘ **calculate a weighted average cash flow and discount this cash flow by the firm's weighted average cost of capital.**
When applying claims valuation, cash flows accruing to the stockholders are discounted at the firm's cost of equity and cash flows accruing to the bondholders are discounted at the yield-to-maturity of the firm's debt.

Question 2
L2R23TB-ITEMSET-AC001-1512
LOS: LOS-7320
LOS: LOS-7400
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium

Use the following information to answer the next three questions:

Jude Fashions of Amman (JFA) is one of the leading fashion designers in Jordan. It plans to invest 10,000 Jordanian Dinars (JOD) in an asset. As a result of adding this asset, sales are expected to increase by JOD 12,000 annually and cash costs will rise by JOD 8,000 for each of the next two years. The asset will be depreciated to zero (fully depreciated) using the straight-line method over two years. An analyst has estimated that JFA will be able to sell the asset for JOD 1,000 at the end of Year 2.

JFA's applicable tax rate is 30 percent and JFA's capital structure consists of 60 percent equity and 40 percent debt. Based on current market conditions, the yield to maturity (YTM) on the company's long-term debt is 7.14 percent and the estimated cost of equity at 11.67 percent.

The president and the CFO were discussing the asset and how to assess its value. The CFO states that the asset's (project's) estimated net present value (NPV) found using discounted cash flow analysis based on basic capital budgeting will exceed the estimated NPV based on the asset's (project's) economic profits. He adds that this results because economic profits, which have depreciation deducted, are lower than cash flows, which have depreciation added back.

i.
In finding the economic income for Year 1, the market value of the asset at the end of Year 1 will be *closest to*:

- JOD 7,800
- JOD 4,600
- JOD 4,250

Rationale

This Answer is Correct

The market value for an asset is equal to the present value of all its future cash flows. Since the project has a two-year life and we are estimating the market value at the end of Year 1, we are only concerned with the cash flows occurring in Year 2. These cash flows are the after-tax operating cash flow (OCF) for Year 2 and the terminal year nonoperating cash flow. Once these cash flows are found, we need to discount them back to the end of Year 1 using the weighted average cost of capital, which has to be calculated. The calculations are as follows:

$$\text{OCF} = (\text{S} - \text{C} - \text{D})(1 - \text{T}) + \text{D} = \left(12{,}000 - 8{,}000 - \frac{10{,}000}{2}\right)(1 - 0.30) + 5{,}000 = 4{,}300$$

$$\begin{aligned} \text{Terminal year nonoperating cash flow} &= \text{Sal}_T + \text{NWCInv} - \text{T}(\text{Sal}_T - \text{B}_T) \\ &= 1{,}000 + 0 - 0.30(1{,}000 - 0) = 700 \end{aligned}$$

$$\text{WACC} = w_d r_d (1 - t) + w_p r_p + w_e r_e = (0.4)(0.0714)(1 - 0.3) + 0 + (0.6)(0.1167) = 0.09$$

$$\text{Market value} = \frac{4{,}300 + 700}{(1 + 0.09)^1} = 4{,}587$$

Rationale

This Answer is Correct

The market value for an asset is equal to the present value of all its future cash flows. Since the project has a two-year life and we are estimating the market value at the end of Year 1, we are only concerned with the cash flows occurring in year 2. These cash flows are the after-tax operating cash flow (OCF) for Year 2 and the terminal year nonoperating cash flow. Once these cash flows are found, we need to discount them back to the end of Year 1 using the weighted average cost of capital, which has to be calculated. The calculations are as follows:

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$$\text{Market value} = \frac{4{,}300 + 700}{(1 + 0.09)^1} = 4{,}587$$

ii.

The estimated net present value (in JOD) based on the asset's (project's) economic profits is *closest to*:

- –2,810
- –1,850
- 4,690

Rationale

This Answer is Incorrect

The first step is to find the economic profit (EP) for each of the two years the machine will be in use. Economic profit is equal to NOPAT minus $WACC, with NOPAT being EBIT × (1 – tax rate) and $WACC being the beginning of each period investment amount times the weighted average cost of capital. The calculations are as follows:

$$\begin{aligned}\text{NOPAT}_{\text{year}} &= \text{EBIT} \times \left(1 - \frac{\text{Tax}}{\text{rate}}\right) \\ &= \left(\text{Sales} - \frac{\text{Cash}}{\text{costs}} - \text{Depreciation} + \frac{\text{Gain on equipment}}{\text{sale(end of year 2)}}\right) \times \left(1 - \frac{\text{Tax}}{\text{rate}}\right)\end{aligned}$$

$$\text{NOPAT}_1 = \left(12{,}000 - 8{,}000 - \frac{10{,}000}{2} + 0\right)(1 - 0.30) = -700$$

$$\text{NOPAT}_2 = \left(12{,}000 - 8{,}000 - \frac{10{,}000}{2} + (1{,}000 - 0)\right)(1 - 0.30) = 0$$

$\text{WACC}_{\text{year}}$ = Investment (beginning of year book value for asset) × WACC

$$\text{WACC} = w_d r_d (1 - t) + w_p r_p + w_e r_e = (0.4)(0.0714)(1 - 0.3) + 0 + (0.6)(0.1167) = 0.09$$

$$\$\text{WACC}_1 = 10{,}000 \times 0.09 = 900$$

$$\$\text{WACC}_2 = \left(10{,}000 - \frac{10{,}000}{2}\right) \times 0.09 = 450$$

Economic Profit_1 = NOPAT – $WACC = –700 – 900 = –1,600

Economic Profit_2 = NOPAT – $WACC = 0 – 450 = –450

$$\text{NPV} = \sum_{t=1}^{\infty} \frac{\text{EP}_t}{(1 + \text{WACC})^t} = \frac{-1{,}600}{(1 + 0.09)^1} + \frac{-450}{(1 + 0.09)^2} = -1{,}847$$

Rationale

This Answer is Incorrect

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Economic Profit$_1$ = NOPAT – \$WACC = –700 – 900 = –1,600

Economic Profit$_2$ = NOPAT – \$WACC = 0 – 450 = –450

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Rationale

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Economic Profit$_1$ = NOPAT – \$WACC = –700 – 900 = –1,600

Economic Profit$_2$ = NOPAT – \$WACC = 0 – 450 = –450

$$\text{NPV} = \sum_{t=1}^{\infty} \frac{\text{EP}_t}{(1+\text{WACC})^t} = \frac{-1{,}600}{(1+0.09)^1} + \frac{-450}{(1+0.09)^2} = -1{,}847$$

iii.

The CFO's comment concerning the asset's (project's) estimated NPV using discounted cash flow analysis based on basic capital budgeting as compared to its estimated NPV based on the asset's (project's) economic profits is

most likely:

- (•) incorrect.
- ( ) correct, and the reason he provided explains why this occurs.
- ( ) correct, but the reason he provided to explain why this occurs is incorrect.

Rationale

This Answer is Incorrect

For the same project, the NPV under any of the approaches considered should be the same. This assumes consistent assumptions are being applied. Thus, the CFO's statement is incorrect.

Rationale

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Question 3
L2CF-TBB205-1412
LOS: LOS-7360
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium
An analyst who uses market risk methods to estimate the required return from a capital project will assume that:

- (●) Only systematic risk is priced and companies are fully diversified.
- ( ) Total risk is priced and companies are fully invested in the capital project.
- ( ) Only systematic risk is priced and companies are fully invested in the project.

Rationale

This Answer is Correct
Using market risk methods like the CAPM implicitly assumes that only market risk offers a risk premium, and therefore, companies are diversified when making project investment decisions.

Question 4
L2R23TB-AC032-1512
LOS: LOS-7340
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

LP Industries (LPI) is evaluating the following two mutually exclusive projects:

	Project K	Project G
Cost	700	190
Annual after-tax cash flows	200	95
Expected life	5 years	3 years
Applicable cost of capital	10 percent	10 percent

Using the equivalent annual annuity (EAA) approach, LPI will *most likely* select project:

- K because it has an EAA of 58.2, which exceeds project G's EAA.
- G because it has an EAA of 18.6, which exceeds project K's EAA.
- G because it has an EAA of 23.13, which exceeds project K's EAA.

Rationale

K because it has an EAA of 58.2, which exceeds project G's EAA.

There is a two-step process to finding the EAA for each project. First, find the net present value for each. Then, find the annuity payment—the EAA—for the project's life that results in the same NPV.

Using a financial calculator, the NPV and EAA are calculated as follows:

	Project K	Project G
NPV inputs	$CF_0 = -700$, $CF_{1-5} = 200$, I/Y = 10	$CF_0 = -190$, $CF_{1-2} = 95$, n = 3, I/Y = 10
Calculated NPV	58.16	46.25
EAA inputs	PV = 58.16, N = 5, I/Y = 10	PV = 46.25, N = 3, I/Y = 10
Calculated EAA (PMT)	15.3	18.6

Project G has a higher EAA, so it should be selected over the mutually exclusive project K.

Rationale

G because it has an EAA of 18.6, which exceeds project K's EAA.

There is a two step process to finding the EAA for each project. First, find the net present value for each. Then find the annuity payment—the EAA—for the project's life that results in the same NPV.

Using a financial calculator, the NPV and EAA are calculated as follows:

	Project K	Project G
NPV inputs	$CF_0 = -700$, $CF_{1-5} = 200$, I/Y = 10	$CF_0 = -190$, $CF_{1-2} = 95$, n = 3, I/Y = 10
Calculated NPV	58.16	46.25

	Project K	Project G
EAA inputs	PV = 58.16, N = 5, I/Y = 10	PV = 46.25, N = 3, I/Y = 10
Calculated EAA (PMT)	15.3	18.6

Project G has a higher EAA, so it should be selected over the mutually exclusive project K.

Rationale

G because it has an EAA of 23.13, which exceeds project K's EAA.

There is a two step process to finding the EAA for each project. First, find the net present value for each. Then find the annuity payment—the EAA—for the project's life that results in the same NPV.

Using a financial calculator, the NPV and EAA are calculated as follows:

	Project K	Project G
NPV inputs	$CF_0 = -700$, $CF_{1\text{-}5} = 200$, I/Y = 10	$CF_0 = -190$, $CF_{1\text{-}2} = 95$, n = 3, I/Y = 10
Calculated NPV	58.16	46.25
EAA inputs	PV = 58.16, N = 5, I/Y = 10	PV = 46.25, N = 3, I/Y = 10
Calculated EAA (PMT)	15.3	18.6

Project G has a higher EAA, so it should be selected over the mutually exclusive project K.

Question 5
L2R23TB-AC011-1512
LOS: LOS-7330
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium
Mr. Zade at Global Enterprise prepares a project's cash flow estimates in real terms and discounts these cash flows using the WACC stated in nominal terms. The project's NPV will *most likely* be:

- correct.
- overstated.
- understated.

Rationale
correct.
The nominal discount rate is greater than the real discount rate because the nominal rate accounts for inflation. Using the greater (nominal) discount rate to discount the cash flows stated in real terms (which already are shrunk to exclude inflation) understates the project's NPV. The discount rate used should be consistent with the cash flows.

Rationale
overstated.
The nominal discount rate is greater than the real discount rate because the nominal rate accounts for inflation. Using the greater (nominal) discount rate to discount the cash flows stated in real terms (which already are shrunk to exclude inflation) understates the project's NPV. The discount rate used should be consistent with the cash flows.

Rationale
understated.
The nominal discount rate is greater than the real discount rate because the nominal rate accounts for inflation. Using the greater (nominal) discount rate to discount the cash flows stated in real terms (which already are shrunk to exclude inflation) understates the project's NPV. The discount rate used should be consistent with the cash flows.

Question 6
L2R23TB-AC027-1512
LOS: LOS-7330
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium
A project was evaluated and funded based on projections and discount rates that assumed 3.2 percent inflation. If inflation is higher in the future than the assumed 3.2 percent, the *most likely* outcome is that the:

- holders of the company's fixed-rate bonds benefit.
- project's revenues minus costs will be higher than originally projected.
- value of depreciation tax savings is lower if the tax system does not adjust for inflation.

Rationale

holders of the company's fixed-rate bonds benefit.
Inflation is built into the discount rate, and higher than expected inflation means that a higher discount should have been used. Higher inflation has no effect on the amount of depreciation allowed for taxes, unless the tax system adjusts for inflation—not the case here. As a result, the depreciation tax savings each year are unchanged. Combining these outcomes, we are discounting the same amount of depreciation tax savings at a higher discount rate, which reduces the value of depreciation tax savings.

Rationale

project's revenues minus costs will be higher than originally projected.
Inflation is built into the discount rate, and higher than expected inflation means that a higher discount should have been used. Higher inflation has no effect on the amount of depreciation allowed for taxes, unless the tax system adjusts for inflation—not the case here. As a result, the depreciation tax savings each year are unchanged. Combining these outcomes, we are discounting the same amount of depreciation tax savings at a higher discount rate, which reduces the value of depreciation tax savings.

Rationale

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Inflation is built into the discount rate, and higher than expected inflation means that a higher discount should have been used. Higher inflation has no effect on the amount of depreciation allowed for taxes, unless the tax system adjusts for inflation—not the case here. As a result, the depreciation tax savings each year are unchanged. Combining these outcomes, we are discounting the same amount of depreciation tax savings at a higher discount rate, which reduces the value of depreciation tax savings.

Question 7
L2FR-PQ2213-1410
LOS: LOS-7340
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

The management of Centuro Associates is evaluating several projects for investment, information regarding which is given in the following table:

Project	Outlay ($ millions)	PV of Future After-Tax Cash Flows ($ millions)	NPV ($ millions)
A	15	23	8
B	12	26	14
C	25	31	6
D	22	38	16
E	30	48	18
F	18	32	14
G	20	30	10
Total	142		

Given that the management has a total capital budget of $72 million and that the projects are not divisible, the optimal combination of projects that it can invest in is:

- Projects B, D, E, and F.
- Projects B, D, F, and G.
- Projects A, B, D, and F.

Rationale
This Answer is Correct

Project	Outlay ($ millions)	PV of Future Cash Flows ($ millions)	NPV ($ millions)	PI	Rank
A	15	23	8	1.533	5
B	12	26	14	2.167	1
C	25	31	6	1.240	7
D	22	38	16	1.727	3
E	30	48	18	1.600	4
F	18	32	14	1.778	2
G	20	30	10	1.500	6

The company should definitely invest in Projects B, F, and D, which require a combined investment of $52 million. The project ranked at number 4 is Project E; however, it requires an investment of $30 million, while the company has only $20 million left. Among Projects A, G, and C, Project A is ranked the highest and requires an investment of $15 million, which is within the company's budget. However, Project G is affordable and has a higher NPV than Project A; hence, it should be chosen to maximize NPV. Note that PI ratios are a useful guide to rank projects, but the capital budgeting objective is always to maximize total NPV.

Question 8
L2R23TB-AC031-1512
LOS: LOS-7340
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

Yorba Linda Park (YLP) is evaluating the following two projects:

	Project T	Project Z
Cost	275	300
Annual after-tax operating savings	225	170
Expected life	2 years	4 years
Applicable cost of capital	10 percent	10 percent

Assuming the projects are mutually exclusive and using the least common multiple of lives approach, YLP will *most likely* select project:

- T because it has a NPV of 212.
- T because it has a NPV of 439.
- Z because it has a NPV of 239.

Rationale
T because it has a NPV of 212.

Each project is extended to four years, which entails repeating project T twice. The cash flows for each project over the four-year horizon are:

Year	Project T's OCFs	P.V. of T's OCFs @ 10%	Project Z's OCFs	P.V. of Z's OCFs @ 10%
0	(275)	(275)	(300)	(300)
1	225	205	170	155
2	(50)[1]	(41)	170	140
3	225	169	170	128
4	225	154	170	116
		212		239

1 The cash flow at the end of Year 2 is a 50 outflow from the after-tax operating savings of 225 minus the 275 cost to invest again in a new project T.

Project Z should be selected, because its 239 NPV over the entire four-year horizon is higher than project T's NPV.

Rationale
T because it has a NPV of 439.

Each project is extended to four years, which entails repeating project T twice. The cash flows for each project over the four-year horizon are:

Year	Project T's OCFs	P.V. of T's OCFs @ 10%	Project Z's OCFs	P.V. of Z's OCFs @ 10%

Year	Project T's OCFs	P.V. of T's OCFs @ 10%	Project Z's OCFs	P.V. of Z's OCFs @ 10%
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1	225	205	170	155
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Rationale

Z because it has a NPV of 239.

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Year	Project T's OCFs	P.V. of T's OCFs @ 10%	Project Z's OCFs	P.V. of Z's OCFs @ 10%
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1	225	205	170	155
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		212		239

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Project Z should be selected, because its 239 NPV over the entire four-year horizon is higher than project T's NPV.

Question 9
L2FR-ITEMSET-PQ2214-1411
LOS: LOS-7370
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

Use the following information to answer the next three questions:

The management of Teluka Inc. is considering an investment in a six-year project. The project requires an initial investment of $90 million and has a 50% chance of being successful.

- If the project is successful, it will generate annual cash flows amounting to $30 million throughout its life and have a salvage value of zero at termination.
- If the project is unsuccessful, it will generate annual cash flows amounting to $10 million throughout its life and have a salvage value of zero at termination.

The project's success can be determined at the end of Year 1 based on the cash flow generated. Further, if it is determined that the project is unsuccessful, it can be abandoned right away for a salvage value of $60 million.

The company's required rate of return is 10%.

i.
The NPV of the project without considering the abandonment option is *closest to*:

- (●) -$2.89 million
- ( ) -$24.67 million
- ( ) $84.21 million

Rationale
This Answer is Correct

Initial investment = $90 million

Expected annual after-tax cash flows for 6 years = ($30m × 0.5) + ($10m × 0.5) = $20m

Therefore, NPV is calculated as:

[CF] [2^{ND}] [CE|C]

90,000,000 [+/−] [Enter] [↓]

20,000,000 [Enter] [↓]

6 [Enter]

[NPV] 10 [Enter] [↓] [CPT]

NPV = −$2,894,786.01

ii.
The NPV of the project with the abandonment option is *closest to*:

- (●) $7.15 million
- ( ) -$26.36 million
- ( ) $40.65 million

Rationale

This Answer is Correct

NPV of the project if it is abandoned at the end of Year 1:

[CF] [2^{ND}] [CE|C]

90,000,000 [+/−] [Enter] [↓]

70,000,000 [Enter]

[NPV] 10 [Enter] [↓] [CPT]

NPV = −$26,363,636.36

NPV of the project if it is not abandoned at the end of Year 1:

[CF] [2^{ND}] [CE|C]

90,000,000 [+/−] [Enter] [↓]

30,000,000 [Enter] [↓]

6 [Enter]

[NPV] 10 [Enter] [↓] [CPT]

NPV = $40,657,820.98

Expected NPV with the abandonment option:

NPV = 0.5 × (−26,363,636.36) + (0.5 × 40,657,820.98) = $7,147,092.31

iii.

The value of abandonment option is *closest* to:

- $7,147,092
- 4,252,306 million
- 10,041,878

Rationale

This Answer is Correct

Value of real option = NPV (with abandonment option) − NPV (without abandonment option)= 7,147,092.31 − (−$2,894,786.01)= 10,041,878.32 million

Question 10
L2FR-PQ2211-1410
LOS: LOS-7330
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium
A higher-than-expected inflation rate *least likely* reduces the value of:

- (●) Real taxes.
- ( ) Real future cash flows.
- ( ) Real payments to bondholders.

Rationale

This Answer is Correct
Higher-than-expected inflation increases real taxes as it reduces the value of the depreciation tax shelter (unless the tax system adjusts depreciation for inflation).

Question 11
L2CF-TB0003-1412
LOS: LOS-7340
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

An analyst is considering the following two mutually exclusive projects with unequal lives:

Time	0	1	2	3
Project A	–110	70	100	0
Project B	–130	70	60	50

If the projects are to be repeated on an ongoing basis as part of a replacement chain, and the company's cost of capital is 10%, which project should be accepted?

- (●) Project A.
- ( ) Project B.
- ( ) Both projects are equally attractive.

Rationale

This Answer is Correct

Using the least common multiple of lives approach, the NPV can be calculated for the replacement chain of repeating project A three times and project B two times as follows:

Time	0	1	2	3	4	5	6	NPV
Project A	–110	70	–10	70	–10	70	100	£82.77
Project B	–130	70	60	–80	70	60	50	£33.10

This indicates project A should be selected. This question could also have been answered using the equivalent annual annuity method.

Question 12
L2R23TB-AC020-1512
LOS: LOS-7320
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium
Farouqi Football Club (FFC) of London plans to invest £10 million in a project that will increase operating income (excluding depreciation) by £4 million annually for two years. The project will be fully depreciated using the straight-line method over two years, and the initial investment is expected to be worthless at the end of Year 2. FFC's overall cost of capital is 10 percent. FFC's tax rate is 40 percent. For capital budgeting purposes, after-tax operating cash flow in Year 1 is *closest to*:

- (•) £4.4 million.
- ( ) £5.6 million.
- ( ) £7.4 million.

Rationale
£4.4 million.
For the analysis, the increase in operating income excluding depreciation (sales – operating costs or just S – C) is given as being £4 million. Since the original investment is being fully depreciated, the annual depreciation is £5 million (£10 million / 2). With these inputs, the annual after-tax operating cash flow for Year 1 is calculated as follows:

$$\text{OCF} = (\text{S} - \text{C} - \text{D}) \quad (1 - \text{T}) + \text{D} = (£4 \text{ million} - 5 \text{ million})(1 - 0.40) + \quad £5 \text{ million} = £4.4 \text{ million}$$

Rationale
£5.6 million.
For the analysis, the increase in operating income excluding depreciation (sales – operating costs or just S – C) is given as being £4 million. Since the original investment is being fully depreciated, the annual depreciation is £5 million (£10 million / 2). With these inputs, the annual after-tax operating cash flow for Year 1 is calculated as follows:

$$\text{OCF} = (\text{S} - \text{C} - \text{D}) \quad (1 - \text{T}) + \text{D} = (£4 \text{ million} - 5 \text{ million})(1 - 0.40) + \quad £5 \text{ million} = £4.4 \text{ million}$$

Rationale
£7.4 million.
For the analysis, the increase in operating income excluding depreciation (sales – operating costs or just S – C) is given as being £4 million. Since the original investment is being fully depreciated, the annual depreciation is £5 million (£10 million / 2). With these inputs, the annual after-tax operating cash flow for Year 1 is calculated as follows:

$$\text{OCF} = (\text{S} - \text{C} - \text{D}) \quad (1 - \text{T}) + \text{D} = (£4 \text{ million} - 5 \text{ million})(1 - 0.40) + \quad £5 \text{ million} = £4.4 \text{ million}$$

Question 13
L2R23TB-AC023-1512
LOS: LOS-7400
Lesson Reference: Lesson 4: Other Income Measures and Valuation Models
Difficulty: medium

An analyst has calculated (in $ millions) the following net income and total capital invested (assets) for a three-year project:

Year	NI	Beginning of Period Book Value of Equity	Total Capital Invested (Beginning of Year)
1	18	275	360
2	29	175	240
3	42	75	120

If the company's cost of equity is 12 percent and its weighted average cost of capital is 10 percent, then the project's net present value is *closest to*:

- –$2.7 million.
- $10.3 million.
- $16.5 million.

Rationale
–$2.7 million.

The first step is to find the residual income for each year, which is as follows:

Residual income for period t = Net income for period t – Equity charge for period t

$$\begin{aligned} \mathrm{RI}_t &= \mathrm{NI}_t - \mathrm{r_{CE}B_{t-1}} \\ \mathrm{RI}_1 &= 18 - (0.12)\,(275) = -15 \\ \mathrm{RI}_2 &= 29 - (0.12)\,(175) = 8 \\ \mathrm{RI}_3 &= 42 - (0.12)\,(75) = 33 \end{aligned}$$

The project's net present value is the sum of present values of the residual incomes, discounted at the required rate of return on equity. Thus, the NPV is:

$$\mathrm{NPV} = \sum_{t=1}^{\infty} \frac{\mathrm{RI}_t}{(1+\mathrm{r_{CE}})^t} = \frac{-15}{(1+0.12)^1} + \frac{8}{(1+0.12)^2} + \frac{33}{(1+0.12)^3} = \$16.5 \text{ million}$$

Rationale
$10.3 million.

The first step is to find the residual income for each year, which is as follows:

Residual income for period t = Net income for period t – Equity charge for period t

$$\begin{aligned}\mathrm{RI}_t &= \mathrm{NI}_t - \mathrm{r_{CE}B_{t-1}} \\ \mathrm{RI}_1 &= 18 - (0.12)\,(275) = -15 \\ \mathrm{RI}_2 &= 29 - (0.12)\,(175) = 8 \\ \mathrm{RI}_3 &= 42 - (0.12)\,(75) = 33\end{aligned}$$

The project's net present value is the sum of present values of the residual incomes, discounted at the required rate of return on equity. Thus, the NPV is:

$$\mathrm{NPV} = \sum_{t=1}^{\infty} \frac{\mathrm{RI}_t}{(1+\mathrm{r_{CE}})^t} = \frac{-15}{(1+0.12)^1} + \frac{8}{(1+0.12)^2} + \frac{33}{(1+0.12)^3} = \$16.5 \text{ million}$$

Rationale

$16.5 million.

The first step is to find the residual income for each year, which is as follows:

Residual income for period *t* = Net income for period *t* – Equity charge for period *t*

$$\begin{aligned}\mathrm{RI}_t &= \mathrm{NI}_t - \mathrm{r_{CE}B_{t-1}} \\ \mathrm{RI}_1 &= 18 - (0.12)\,(275) = -15 \\ \mathrm{RI}_2 &= 29 - (0.12)\,(175) = 8 \\ \mathrm{RI}_3 &= 42 - (0.12)\,(75) = 33\end{aligned}$$

The project's net present value is the sum of present values of the residual incomes, discounted at the required rate of return on equity. Thus, the NPV is:

$$\mathrm{NPV} = \sum_{t=1}^{\infty} \frac{\mathrm{RI}_t}{(1+\mathrm{r_{CE}})^t} = \frac{-15}{(1+0.12)^1} + \frac{8}{(1+0.12)^2} + \frac{33}{(1+0.12)^3} = \$16.5 \text{ million}$$

Question 14
L2R23TB-AC024-1512
LOS: LOS-7400
Lesson Reference: Lesson 4: Other Income Measures and Valuation Models
Difficulty: medium

A company is considering buying a new machine at a cost of $24 million.

This machine will increase the company's annual cash sales and annual cash operating costs by $8 million and $4 million, respectively, for the next three years. The machine will be fully depreciated to zero over its three-year life and it is expected to have a salvage value $3.4 million. An initial working capital outlay of $6 million is required and this working capital outlay is recovered at the end of the project. The company's tax rate is 30 percent and its weighted average cost of capital and cost of equity are 7.0 percent and 11.0 percent, respectively. Using a discounted net present value (NPV) approach, the company will *most likely* determine that the new machine's NPV is *closest to*:

- –$7.5 million.
- –$8.2 million.
- –$9.5 million.

Rationale
–$7.5 million.
The calculations required are as follows:

$$\text{Initial outlay} = \text{FC Inv} + \text{WC Inv} = \$24 + 6 = \$30 \text{ million}$$

$$\text{Operating cash flows(OCF)} = (\text{S} - \text{C} - \text{D})(1 - \text{T}) + \text{D} = \left(\$8 - 4 - \frac{24}{3}\right)(1 - 0.30) + \frac{24}{3} = 5.2 \text{ million}$$

$$\text{Terminal year nonoperating cash flow} = \text{Sal}_\text{T} + \text{NWC Inv} - \text{T}(\text{Sal}_\text{T} - \text{B}_\text{T}) = \$3.4 + 6.0 - 0.30(3.4 - 0) = 8$$

$$\text{NPV} = -\$30 + \frac{5.2}{(1+0.07)^1} + \frac{5.2}{(1+0.07)^2} + \frac{5.2 + 8.4}{(1+0.07)^3} = -\$9.5 \text{ million}$$

Rationale
–$8.2 million.
The calculations required are as follows:

$$\text{Initial outlay} = \text{FC Inv} + \text{WC Inv} = \$24 + 6 = \$30 \text{ million}$$

$$\text{Operating cash flows(OCF)} = (\text{S} - \text{C} - \text{D})(1 - \text{T}) + \text{D} = \left(\$8 - 4 - \frac{24}{3}\right)(1 - 0.30) + \frac{24}{3} = 5.2 \text{ million}$$

$$\text{Terminal year nonoperating cash flow} = \text{Sal}_\text{T} + \text{NWC Inv} - \text{T}(\text{Sal}_\text{T} - \text{B}_\text{T}) = \$3.4 + 6.0 - 0.30(3.4 - 0) = 8$$

$$\text{NPV} = -\$30 + \frac{5.2}{(1+0.07)^1} + \frac{5.2}{(1+0.07)^2} + \frac{5.2 + 8.4}{(1+0.07)^3} = -\$9.5 \text{ million}$$

Rationale

–$9.5 million.

The calculations required are as follows:

$$\text{Initial outlay} = \text{FC Inv} + \text{WC Inv} = \$24 + 6 = \$30 \text{ million}$$

$$\text{Operating cash flows(OCF)} = (\text{S} - \text{C} - \text{D})(1 - \text{T}) + \text{D} = \left(\$8 - 4 - \frac{24}{3}\right)(1 - 0.30) + \frac{24}{3} = 5.2 \text{ million}$$

$$\text{Terminal year nonoperating cash flow} = \text{Sal}_\text{T} + \text{NWC Inv} - \text{T}(\text{Sal}_\text{T} - \text{B}_\text{T}) = \$3.4 + 6.0 - 0.30(3.4 - 0) = 8$$

$$\text{NPV} = -\$30 + \frac{5.2}{(1 + 0.07)^1} + \frac{5.2}{(1 + 0.07)^2} + \frac{5.2 + 8.4}{(1 + 0.07)^3} = -\$9.5 \text{ million}$$

Question 15
L2R23TB-AC010-1512
LOS: LOS-7380
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium
Estimating the NPV of a potential investment depends on the level of risk and the variables used to calculate it. In estimating risk, an analyst is *most likely* correct in stating that:

- (●) beta is difficult to measure consistently.
- ( ) the CAPM can be used to estimate a project's stand-alone risk.
- ( ) betas from published sources are readily available for all companies.

Rationale
✔ **beta is difficult to measure consistently.**
Beta is difficult to estimate even for large companies and it is even more difficult for smaller companies and company-owned projects.

Rationale
✘ **the CAPM can be used to estimate a project's stand-alone risk.**
Beta is difficult to estimate even for large companies and it is even more difficult for smaller companies and company-owned projects.

Rationale
✘ **betas from published sources are readily available for all companies.**
Beta is difficult to estimate even for large companies and it is even more difficult for smaller companies and company-owned projects.

Question 16
L2FR-PQ2219-1410
LOS: LOS-7380
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium
Which of the following statements is *most accurate*?

- Investment decisions may sometimes be based on net income instead of cash flows depending on the nature of the investment.
- Economic responses of other market participants should also be considered in capital budgeting analysis.
- Sunk costs and opportunity costs should not be considered in capital budgeting analysis.

Rationale

This Answer is Correct

Investment decisions should always be based on incremental cash flows.

Sunk costs should be ignored in capital budgeting analysis; however, opportunity costs should be considered.

Question 17
L2R23TB-AC029-1512
LOS: LOS-7350
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium
In order to assess a project's stand-alone risk, an analyst has calculated four net present values (NPVs) for a project. These NPVs range from a negative $10 million to a positive $42 million. The four NPVs correspond to economic environments of negative GDP growth, low GDP growth, moderate GDP growth, and high GDP growth. She changes several variables in the NPV calculation to account for the differing economic outcomes. The analyst has *most likely* completed a:

- (●) scenario analysis.
- ( ) sensitivity analysis.
- ( ) Monte Carlo analysis.

Rationale
✔ **scenario analysis.**
The analyst has generated four scenarios based on the economy. In each scenario, she has changed multiple input variables based on the economic environment assumption. Effectively, she has completed a scenario analysis.

Rationale
✘ **sensitivity analysis.**
The analyst has generated four scenarios based on the economy. In each scenario, she has changed multiple input variables based on the economic environment assumption. Effectively, she has completed a scenario analysis.

Rationale
✘ **Monte Carlo analysis.**
The analyst has generated four scenarios based on the economy. In each scenario, she has changed multiple input variables based on the economic environment assumption. Effectively, she has completed a scenario analysis.

Question 18
L2R23TB-AC028-1512
LOS: LOS-7340
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

A manager is considering whether to fund the following three projects:

Project	Investment Outlay	NPV	PI
A	$150,000	$28,000	1.19
B	260,000	26,000	1.10
C	125,000	16,000	1.13

If the manager has been informed that his capital budget is $400,000, then the manager *most likely* should opt to fund projects:

- A and B.
- A and C.
- B and C.

Rationale
A and B.
The highest NPV within the budget constraint occurs when Projects A and C are funded, which combine to have a total NPV of $44,000. The manager cannot fund A and B, as their combined cost of $410,000 exceeds the budget constraint of $400,000. The combination of funding B and C is within the budget constraint, but results in lower NPV of $42,000 than the $44,000 resulting from funding A and C.

Rationale
A and C.
The highest NPV within the budget constraint occurs when Projects A and C are funded, which combine to have a total NPV of $44,000. The manager cannot fund A and B, as their combined cost of $410,000 exceeds the budget constraint of $400,000. The combination of funding B and C is within the budget constraint, but results in lower NPV of $42,000 than the $44,000 resulting from funding A and C.

Rationale
B and C.
The highest NPV within the budget constraint occurs when Projects A and C are funded, which combine to have a total NPV of $44,000. The manager cannot fund A and B, as their combined cost of $410,000 exceeds the budget constraint of $400,000. The combination of funding B and C is within the budget constraint, but results in lower NPV of $42,000 than the $44,000 resulting from funding A and C.

Question 19
L2R23TB-AC025-1512
LOS: LOS-7400
Lesson Reference: Lesson 4: Other Income Measures and Valuation Models
Difficulty: medium
A company is considering replacing an existing machine with a new machine that will cost €40 million but will reduce the company's operating costs by €5 million and increase revenues by €6 million each year for the four years of its estimated life. This new machine will be depreciated to zero over that period using straight-line depreciation but is expected to have a €5 million salvage value. The old machine has an existing book value of €12 million and it is being depreciated to zero over its remaining four-year life. If sold today, the machine is worth is €10 million. If it is not replaced, in four years it can be sold for €1 million. The company's tax rate is 40 percent and its weighted average cost of capital and cost of equity are 8.0 percent and 12.5 percent, respectively. Using a discounted net present value (NPV) approach, the company will *most likely* determine that the replacement project's NPV is:

- (●) greater than €0 but less than €4 million.
- ( ) greater than €4 million.
- ( ) negative.

Rationale

✓ greater than €0 but less than €4 million.

$$\text{Initial Outlay} = \text{FC Inv} + \text{WC Inv} - \text{Sal}_0 + (\text{Sal}_0 - \text{B}_0)(t) = 40 + 0 - 10 + (10 - 12)\,(0.40) = 29.2$$

$$\begin{aligned}
&\text{OCF}_{\text{Incr.}} \\
&= (\Delta\text{S} - \Delta\text{C} - \Delta\text{DEPR})(1 - t) + \Delta\text{DEPR} \\
&= \left[6 - (-5) - \left(\tfrac{40-0}{4} - \tfrac{12-0}{4}\right)\right](1 - 0.40) + \left(\tfrac{40-0}{4} - \tfrac{12-0}{4}\right) \\
&= 9.4 \\
&\text{TNOCF}_{\text{Incr.}} \\
&= \Delta\text{Sal}_\text{T} + \Delta\text{WC Inv} - (\Delta\text{Sal}_\text{T} - \Delta\text{B}_\text{T})(t) \\
&(5 - 1) + 0 - [(5 - 1) - (0 - 9)](0.40) = -1.2 \\
&\text{NPV} = -29.2 + \tfrac{9.4}{(1+0.08)^1} + \tfrac{9.4}{(1+0.08)^2} + \tfrac{9.4}{(1+0.08)^3} + \tfrac{9.4+2.4}{(1+0.08)^4} = 3.698 \text{ million}
\end{aligned}$$

Rationale

✗ greater than €4 million.

$$\text{Initial Outlay} = \text{FC Inv} + \text{WC Inv} - \text{Sal}_0 + (\text{Sal}_0 - \text{B}_0)(t) = 40 + 0 - 10 + (10 - 12)\,(0.40) = 29.2$$

$$\begin{aligned}
&\text{OCF}_{\text{Incr.}} \\
&= (\Delta\text{S} - \Delta\text{C} - \Delta\text{DEPR})(1 - t) + \Delta\text{DEPR} \\
&= \left[6 - (-5) - \left(\tfrac{40-0}{4} - \tfrac{12-0}{4}\right)\right](1 - 0.40) + \left(\tfrac{40-0}{4} - \tfrac{12-0}{4}\right) \\
&= 9.4 \\
&\text{TNOCF}_{\text{Incr.}} \\
&= \Delta\text{Sal}_\text{T} + \Delta\text{WC Inv} - (\Delta\text{Sal}_\text{T} - \Delta\text{B}_\text{T})(t) \\
&(5 - 1) + 0 - [(5 - 1) - (0 - 9)](0.40) = -1.2 \\
&\text{NPV} = -29.2 + \tfrac{9.4}{(1+0.08)^1} + \tfrac{9.4}{(1+0.08)^2} + \tfrac{9.4}{(1+0.08)^3} + \tfrac{9.4+2.4}{(1+0.08)^4} = 3.698 \text{ million}
\end{aligned}$$

Rationale

negative.

$$\text{Initial Outlay} = \text{FC Inv} + \text{WC Inv} - \text{Sal}_0 + (\text{Sal}_0 - \text{B}_0)(t) = 40 + 0 - 10 + (10 - 12)\,(0.40) = 29.2$$

$$\begin{gathered}
\text{OCF}_{\text{Incr.}} \\
= (\Delta\text{S} - \Delta\text{C} - \Delta\text{DEPR})(1 - t) + \Delta\text{DEPR} \\
= \left[6 - (-5) - \left(\tfrac{40-0}{4} - \tfrac{12-0}{4}\right)\right](1 - 0.40) + \left(\tfrac{40-0}{4} - \tfrac{12-0}{4}\right) \\
= 9.4 \\
\text{TNOCF}_{\text{Incr.}} \\
= \Delta\text{Sal}_\text{T} + \Delta\text{WC Inv} - (\Delta\text{Sal}_\text{T} - \Delta\text{B}_\text{T})(t) \\
(5 - 1) + 0 - [(5 - 1) - (0 - 9)](0.40) = -1.2 \\
\text{NPV} = -29.2 + \tfrac{9.4}{(1+0.08)^1} + \tfrac{9.4}{(1+0.08)^2} + \tfrac{9.4}{(1+0.08)^3} + \tfrac{9.4+2.4}{(1+0.08)^4} = 3.698 \text{ million}
\end{gathered}$$

Question 20
L2CF-TBB206-1412
LOS: LOS-7370
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

Stella Bell is the finance director of Olfactor Inc., a manufacturer of children's toys. Bell considers the NPV of the expected cash flows from a new product line to be –£0.3 million; however, she is evaluating an incremental investment of £0.1 million, which would give the management flexibility to pursue new markets should domestic demand growth not materialize. The option to switch to new markets when they are growing faster than domestic markets has an estimated value of £0.5 million.

Bell should recommend to her board to accept:

- The new product line project both with the incremental investment and without the incremental investment.
- The new product line project without the incremental investment.
- The new product line project with the incremental investment.

Rationale

This Answer is Correct

Without the incremental investment that provides production flexibility, the new product line has a negative NPV and should not be accepted. The expected NPV of the new product line with the production flexibility is –£0.3 million – £0.1 million + £0.5 million = £0.1 million. Because it has a positive NPV, this project should be accepted.

Question 21
L2FR-PQ2222-1410
LOS: LOS-7400
Lesson Reference: Lesson 4: Other Income Measures and Valuation Models
Difficulty: medium

Consider the following statements:

Statement 1: Economic profit is calculated as earnings before interest and tax minus the dollar cost of capital.

Statement 2: Residual income is calculated as net income for the period minus the dollar cost of capital.

Which of the following is *most likely*?

- Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are incorrect.

Rationale

This Answer is Correct

Economic profit is calculated as net operating profit after tax minus the dollar cost of capital.

Residual income is calculated as net income for the period minus equity charge for the period.

Question 22
L2R23TB-AC036-1512
LOS: LOS-7350
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium
When analyzing a project's net present value (NPV), scenario analysis is *most likely* able to provide:

- (●) the possible range of reasonable outcomes.
- ( ) which variable has the greatest impact on NPV.
- ( ) the minimal level of sales necessary to break-even on a financial basis.

Rationale
✔ **the possible range of reasonable outcomes.**
Scenario analysis is able to identify the possible range of reasonable outcomes for the NPV of a project.

Rationale
✘ **which variable has the greatest impact on NPV.**
Scenario analysis is able to identify the possible range of reasonable outcomes for the NPV of a project.

Rationale
✘ **the minimal level of sales necessary to break-even on a financial basis.**
Scenario analysis is able to identify the possible range of reasonable outcomes for the NPV of a project.

Question 23
L2CF-TB0002-1412
LOS: LOS-7330
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium
When performing capital budgeting appraisals, an increase in inflation will *most likely* result in:

- Lower real taxes.
- Higher real taxes.
- No change in real taxes.

Rationale

This Answer is Correct
In an inflationary environment, the fixed depreciation charge will shrink in real terms leading to a reduction in the deprecation tax shield, and hence, higher real taxes paid by companies.

Question 24

L2CF-TBB207-1412

LOS: LOS-7340

Lesson Reference: Lesson 3: Project Analysis and Evaluation

Difficulty: medium

The static trade-off theory of capital structure developed by Modigliani and Miller suggests that companies should raise debt capital until the incremental cost of distress outweigh the incremental tax shield benefits. Which of the following management teams is *most likely* to be able to follow this theory in practice?

- A management team with a target debt rating of no lower than AA.
- A management team that has a target of increasing the debt rating of its bonds from speculative grade to investment grade in order to lower its cost of capital.
- A management team that makes capital structure decisions without regard for a target debt rating for the company's bonds.

Rationale

This Answer is Correct

In practice, most corporate managers consider the company's debt ratings in their policies regarding capital structure. When a debt rating needs to be maintained or improved, it is unlikely that management will follow the theory of borrowing until the marginal benefit of the tax shield equals the marginal cost of financial distress.

Question 25
L2R23TB-AC013-1512
LOS: LOS-7340
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

A manager gathers the following data for a company with 40 percent debt and 60 percent equity in its capital structure:

Required return on debt	7 percent
Required return on firm's equity	10 percent
Risk-free rate of return	4 percent
Market equity risk premium	6 percent
Company beta	1.15
Project X beta	1.50
Project Y beta	0.80

If the firm applies its overall weighted average cost of capital (WACC) to discount each new project's cash flows, the *most likely* effect on each project's NPV is that:

- Project X is overvalued and project Y is overvalued.
- Project X is overvalued and project Y is undervalued.
- Project X is undervalued and project Y is overvalued.

Rationale

Project X is overvalued and project Y is overvalued.

The cost of debt is the same for each project, but based on their respective betas, there should be differing WACCs applied than the company's WACC. Project X has a higher beta than the company's beta, indicating that it is more risky and the WACC used to discount its cash flows should be adjusted upward. If the company's WACC (lower than warranted) is used to discount project X's cash flows, then project X is likely to be overvalued.

Project Y has a lower beta than the company's beta, indicating that it is less risky and the WACC used to discount its cash flows should be adjusted downward. If the company's WACC (higher than warranted) is used to discount project Y's cash flows, then project Y is likely to be undervalued.

Rationale

Project X is overvalued and project Y is undervalued.

The cost of debt is the same for each project, but based on their respective betas, there should be differing WACCs applied than the company's WACC. Project X has a higher beta than the company's beta, indicating that it is more risky and the WACC used to discount its cash flows should be adjusted upward. If the company's WACC (lower than warranted) is used to discount project X's cash flows, then project X is likely to be overvalued.

Project Y has a lower beta than the company's beta, indicating that it is less risky and the WACC used to discount its cash flows should be adjusted downward. If the company's WACC (higher than warranted) is

used to discount project Y's cash flows, then project Y is likely to be undervalued.

Rationale

Project X is undervalued and project Y is overvalued.

The cost of debt is the same for each project, but based on their respective betas, there should be differing WACCs applied than the company's WACC. Project X has a higher beta than the company's beta, indicating that it is more risky and the WACC used to discount its cash flows should be adjusted upward. If the company's WACC (lower than warranted) is used to discount project X's cash flows, then project X is likely to be overvalued.

Project Y has a lower beta than the company's beta, indicating that it is less risky and the WACC used to discount its cash flows should be adjusted downward. If the company's WACC (higher than warranted) is used to discount project Y's cash flows, then project Y is likely to be undervalued.

Question 26
L2FR-ITEMSET-PQ2207-1411
LOS: LOS-7320
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium

Use the following information to answer the next four questions:

Salinto Investments is considering replacing an old piece of equipment. The following information is provided:

- The equipment it wants to replace (old equipment) was purchased 15 years ago for $4.5m. It had a useful life of 25 years and the company applies straight-line depreciation with zero salvage value. The equipment's current market value is $2m. If the company keeps using it, this piece of equipment will generate annual sales of $355,000 and incur annual cash operating expenses of $170,000. At the end of its useful life, the company expects to sell the equipment for $260,000.
- The new equipment will cost $6m and will be depreciated on a straight-line basis over 10 years with zero salvage value. The company expects to be able to sell it for $800,000 after 10 years. The new equipment will require an additional investment of $300,000 in working capital (on top of the working capital invested in the old equipment). It is expected to generate annual sales of $840,000 and require annual cash operating expenses of $400,000.

The company's marginal tax rate is 40%, and the required rate of return is 10%.

i.
The initial investment the company is required to make to replace the old equipment is *closest to*:

- (●) $4,380,000
- ( ) $6,300,000
- ( ) $4,300,000

Rationale
This Answer is Correct

Initial investment = FCInv + NWCInv − Sal_0 + t (Sal_0 − BV_0)

Initial investment = 6,000,000 + 300,000 − 2,000,000 + 0.4(2,000,000 − 1,800,000)

Initial investment = $4,380,000

ii.
The change in after-tax operating cash flow in Year 1 resulting from the investment in the new machine is *closest to*:

- ( ) $597,000
- ( ) $393,000
- (●) $321,000

Rationale
This Answer is Correct

$\Delta CF = (\Delta S - \Delta C)(1 - t) + (t \times \Delta D)$

$\Delta CF = \{[(840{,}000 - 355{,}000) - (400{,}000 - 170{,}000)](1 - 0.4)\} + [0.4 \times (600{,}000 - 180{,}000)] = \$321{,}000$

iii.

The terminal year's after-tax non-operating cash flow (TNOCF) is *closest to*:

- $780,000
- $520,000
- $624,000

Rationale

This Answer is Correct

$TNOCF = \Delta Sal_T + NWCInv - t\,(\Delta Sal_T - B_T)$

$TNOCF = (800{,}000 - 260{,}000) + 300{,}000 - 0.4\,[(800{,}000 - 260{,}000) - (0 - 0)]$

$TNOCF = \$624{,}000$

iv.

The replacement project's NPV is *closest to*:

- -$2,167,015
- -$2,087,015
- -$2,106,870

Rationale

This Answer is Correct

Initial investment outlay = $4,380,000

Annuity of $321,000 for the next 10 years

A single payment of $624,000 at the end of Year 10

Therefore, NPV is calculated as:

[CF] [2^{ND}] [CE|C]

4,380,000 [+/−] [Enter] [↓]

321,000 [Enter] [↓]

9 [Enter] [↓]

945,000 [Enter]

[NPV] 10 [Enter] [↓] [CPT]

NPV = −$2,167,014.95

Question 27

L2CF-TBX101-1502

LOS: LOS-7370

Lesson Reference: Lesson 3: Project Analysis and Evaluation

Difficulty: easy

Which of the following statements regarding real options is *most likely* to be accurate?

- If a project has a positive NPV without considering any associated real options, then the project should be accepted.
- A project that has a negative NPV should be accepted if the project has real options associated with accepting the project.
- A project that has a positive NPV without considering real options but a negative NPV once the associated real options are considered should not be accepted.

Rationale

This Answer is Correct

A real option cannot have a negative value; therefore, if a project has a positive NPV without considering the associated real options, then it can only have a positive NPV once associated real options are considered. Answer B is incorrect since the real option may not increase the NPV of the project enough to make it positive. Answer C is incorrect since a real option cannot have a negative value, and hence, lower the NPV of the project.

Question 28
L2FR-PQ2212-1410
LOS: LOS-7340
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

The directors of Glindale Builders are considering investing in one of the following three projects:

- Project A has a life of 2 years and requires an initial investment of $55,000.
- Project B has a life of 4 years and requires an initial investment of $95,000.
- Project C has a life of 5 years and requires an initial investment of $85,000.

The project chosen by the company will be continuously replicated in the future. After-tax cash flow information regarding the three projects is given below:

Project	Year 1 ($)	Year 2 ($)	Year 3 ($)	Year 4 ($)	Year 5 ($)	Salvage value ($)
A	25,000	30,000				10,000
B	20,000	25,000	30,000	35,000		15,000
C	15,000	15,000	20,000	25,000	25,000	20,000

Given a required rate of return of 10%, which project should the directors invest in?

- (●) Project A
- ( ) Project B
- ( ) Project C

Rationale
This Answer is Correct

NPV of Project A:

[CF] [2^{ND}] [CE|C]

55,000 [+/−] [Enter] [↓]

25,000 [Enter] [↓] [↓]

40,000 [Enter]

[NPV] 10 [Enter] [↓] [CPT]

NPV = $785.124

EAA of Project A:

N = 2; I/Y = 10; PV = −785.124; FV = 0; CPT PMT → PMT = $452.381

NPV of Project B:

[CF] [2^{ND}] [CE|C]

95,000 [+/−] [Enter] [↓]

20,000 [Enter] [↓] [↓]

25,000 [Enter] [↓] [↓]

30,000 [Enter] [↓] [↓]

50,000 [Enter]

[NPV] 10 [Enter] [↓] [CPT]

NPV = $533.09

EAA of Project B:

N = 4; I/Y = 10; PV = −533.09; FV = 0; CPT PMT → PMT = $168.175

NPV of Project C:

[CF] [2^{ND}] [CE|C]

85,000 [+/−] [Enter] [↓]

15,000 [Enter] [↓] [↓]

15,000 [Enter] [↓] [↓]

20,000 [Enter] [↓] [↓]

25,000 [Enter] [↓] [↓]

45,000 [Enter]

[NPV] 10 [Enter] [↓] [CPT]

NPV = $1,076.15

EAA of Project C:

N = 5; I/Y = 10; PV = −1,076.15; FV = 0; CPT PMT → PMT = $283.886

Question 29
L2FR-PQ2220-1410
LOS: LOS-7360
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

Susan Miller, CFA is a financial analyst at SMC International. She is provided with the following information regarding an investment opportunity:

Initial outlay = $100 million

Annual after-tax operating cash flows = $20 million

Project life = 10 years

Terminal-year after-tax nonoperating cash flow = $5 million

Risk-free rate = 6%

Expected return on the market = 13%

Project beta = 1.20

Based on the given information, the NPV and IRR of the investment are *closest to*:

	NPV	IRR
A	$8.41 million	16.39%
B	$4.02 million	15.41%
C	$3.85 million	15.37%

- ○ Row A
- ◉ Row B
- ○ Row C

Rationale

This Answer is Correct

Required rate of return = 0.06 + [1.20 × (0.13 − 0.06)] = 14.4%

[CF] [2^{ND}] [CE|C]

100 [+/−] [Enter] [↓]

20 [Enter] [↓]

9 [Enter] [↓]

25 [Enter]

[NPV] 14.4 [Enter] [↓] [CPT]

NPV = $4.02 million

Question 30
L2R23TB-AC014-1512
LOS: LOS-7340
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

A manager has a capital budget of $1,000,000, and she has five projects to consider. These projects are as follows:

Project	Investment Outlay	NPV	PI	IRR
A	$500,000	$100,600	1.20	32.1 percent
B	400,000	85,800	1.21	33.4 percent
C	320,000	–13,000	0.96	7.9 percent
D	220,000	40,000	1.18	30.2 percent
E	180,000	44,000	1.24	36.4 percent

If the company's weighted average cost of capital is 12 percent, then the manager *most likely* should opt to fund projects:

- A, B, C, and E.
- A, D, and E.
- A and B.

Rationale
A, B, C, and E.
The manager has a budget constraint in that her funds are insufficient to invest in the four projects (A, B, D, and E) that have positive NPVs (each also has a PI > 1 and an IRR > WACC). She must select the set of the projects that will maximize her NPV. By funding A, D, and E, she generates a total NPV of $184,600. In comparison, funding A and B only will generate a total NPV of $186,400. Therefore, the best alternative is to fund only A and B.

Rationale
A, D, and E.
The manager has a budget constraint in that her funds are insufficient to invest in the four projects (A, B, D, and E) that have positive NPVs (each also has a PI > 1 and an IRR > WACC). She must select the set of the projects that will maximize her NPV. By funding A, D, and E, she generates a total NPV of $184,600. In comparison, funding A and B only will generate a total NPV of $186,400. Therefore, the best alternative is to fund only A and B.

Rationale
A and B.
The manager has a budget constraint in that her funds are insufficient to invest in the four projects (A, B, D, and E) that have positive NPVs (each also has a PI > 1 and an IRR > WACC). She must select the set of the projects that will maximize her NPV. By funding A, D, and E, she generates a total NPV of $184,600. In comparison, funding A and B only will generate a total NPV of $186,400. Therefore, the best alternative is to fund only A and B.

Question 31
L2R23TB-AC019-1512
LOS: LOS-7390
Lesson Reference: Lesson 4: Other Income Measures and Valuation Models
Difficulty: medium
In a capital budgeting analysis, interest expense should *most likely*:

- (●) not be subtracted from cash flows when calculating NPV.
- ( ) be subtracted from cash flows when calculating NPV.
- ( ) be subtracted from cash flows when calculating IRR.

Rationale
✔ **not be subtracted from cash flows when calculating NPV.**
Financing costs are not deducted from a project's cash flows when calculating either NPV or IRR. Financing costs are accounted for in the WACC.

Rationale
✘ **be subtracted from cash flows when calculating NPV.**
Financing costs are not deducted from a project's cash flows when calculating either NPV or IRR. Financing costs are accounted for in the WACC.

Rationale
✘ **be subtracted from cash flows when calculating IRR.**
Financing costs are not deducted from a project's cash flows when calculating either NPV or IRR. Financing costs are accounted for in the WACC.

Question 32
L2R23TB-AC030-1512
LOS: LOS-7370
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium
In assessing a project, a company has determined that it can raise its product prices in future years if the product demand is higher than originally projected. The type of real option associated with this project is *most likely* a:

- sizing option.
- flexibility option.
- fundamental option.

Rationale
sizing option.
The ability to change the price or production is a flexibility option. A sizing option involves abandoning the project or making new investment to expand. A fundamental option is where the whole investment is essentially an option.

Rationale
flexibility option.
The ability to change the price or production is a flexibility option. A sizing option involves abandoning the project or making new investment to expand. A fundamental option is where the whole investment is essentially an option.

Rationale
fundamental option.
The ability to change the price or production is a flexibility option. A sizing option involves abandoning the project or making new investment to expand. A fundamental option is where the whole investment is essentially an option.

Question 33
L2R23TB-AC022-1512
LOS: LOS-7400
Lesson Reference: Lesson 4: Other Income Measures and Valuation Models
Difficulty: medium

An analyst has calculated (in $ millions) the following net operating profit after tax and total capital invested (assets) for a three-year project:

Year	NOPAT	Total Capital Invested (Beginning of Year)
1	20	300
2	31	200
3	40	100

If the company's cost of equity is 14 percent and its weighted average cost of capital is 10 percent, then the project's net present value is *closest to*:

- $18.3 million.
- $22.5 million.
- $97.3 million.

Rationale
$18.3 million.

Each year's economic profit has to be found, with the calculations being:

$$\begin{aligned} \text{EP} &= \text{NOPAT} - \$\text{WACC} = \text{NOPAT-WACC} \times \text{Total capital invested (assets)} \\ \text{EP}_1 &= \$20 \text{ million} - 0.10 \times \$300 \text{ million} = -\$10.0 \text{ million} \\ \text{EP}_2 &= \$31 \text{ million} - 0.10 \times \$200 \text{ million} = \$11.0 \text{ million} \\ \text{EP}_3 &= \$40 \text{ million} - 0.10 \times \$100 \text{ million} = \$30.0 \text{ million} \end{aligned}$$

The NPV is then calculated as follows:

$$\text{NPV} = \sum_{t=1}^{\infty} \frac{\text{EP}_t}{(1+\text{WACC})^t} = \frac{-10}{(1+0.10)^1} + \frac{11}{(1+0.10)^2} + \frac{30}{(1+0.10)^3} = \$22.5 \text{ million}$$

Rationale
$22.5 million.

Each year's economic profit has to be found, with the calculations being:

$$\begin{aligned} \text{EP} &= \text{NOPAT} - \$\text{WACC} = \text{NOPAT-WACC} \times \text{Total capital invested (assets)} \\ \text{EP}_1 &= \$20 \text{ million} - 0.10 \times \$300 \text{ million} = -\$10.0 \text{ million} \\ \text{EP}_2 &= \$31 \text{ million} - 0.10 \times \$200 \text{ million} = \$11.0 \text{ million} \\ \text{EP}_3 &= \$40 \text{ million} - 0.10 \times \$100 \text{ million} = \$30.0 \text{ million} \end{aligned}$$

The NPV is then calculated as follows:

$$\mathrm{NPV} = \sum_{t=1}^{\infty} \frac{\mathrm{EP}_t}{(1+\mathrm{WACC})^t} = \frac{-10}{(1+0.10)^1} + \frac{11}{(1+0.10)^2} + \frac{30}{(1+0.10)^3} = \$22.5 \text{ million}$$

Rationale

$97.3 million.

Each year's economic profit has to be found, with the calculations being:

$$\begin{aligned}
\mathrm{EP} &= \mathrm{NOPAT} - \$\mathrm{WACC} = \text{NOPAT-WACC} \times \text{Total capital invested (assets)} \\
\mathrm{EP}_1 &= \$20 \text{ million} - 0.10 \times \$300 \text{ million} = -\$10.0 \text{ million} \\
\mathrm{EP}_2 &= \$31 \text{ million} - 0.10 \times \$200 \text{ million} = \$11.0 \text{ million} \\
\mathrm{EP}_3 &= \$40 \text{ million} - 0.10 \times \$100 \text{ million} = \$30.0 \text{ million}
\end{aligned}$$

The NPV is then calculated as follows:

$$\mathrm{NPV} = \sum_{t=1}^{\infty} \frac{\mathrm{EP}_t}{(1+\mathrm{WACC})^t} = \frac{-10}{(1+0.10)^1} + \frac{11}{(1+0.10)^2} + \frac{30}{(1+0.10)^3} = \$22.5 \text{ million}$$

Question 34

L2CF-TB0004-1412

LOS: LOS-7350

Lesson Reference: Lesson 3: Project Analysis and Evaluation

Difficulty: medium

Which of the following methods of capital budgeting risk assessment is *most likely* to rely heavily on computer processing and specialized software?

- Sensitivity analysis.
- Scenario analysis.
- Simulation analysis.

Rationale

This Answer is Correct

Sensitivity analysis calculates the effect on the NPV of changes in one input variable. Scenario analysis creates scenarios that consist of changes in several of the input variables and calculates the NPV for each scenario. Simulation analysis involves assuming the input variables are random, following their own probability distributions. By simulating the results hundreds or thousands of times, the analyst builds a distribution for the NPV. This method will rely heavily on computer processing and specialized software.

Question 35
L2R23TB-AC034-1512
LOS: LOS-7400
Lesson Reference: Lesson 4: Other Income Measures and Valuation Models
Difficulty: medium
The estimated net present value based on a project's economic profits *most likely* increases if the assumed:

- (●) cost of equity declines, with no change in the cost of debt.
- ( ) operating margin declines.
- ( ) financial leverage declines.

Rationale

✔ **cost of equity declines, with no change in the cost of debt.**
The net present value (NPV) will increase if the economic profit rises in any one period because NOPAT rises or $WACC falls or the WACC declines. A decline in the cost of equity will reduce the WACC, which causes the NPV to rise. Lower financial leverage does not benefit NOPAT because it is EBIT × (1 – tax rate) and EBIT is before interest. But, lower leverage indicates a higher equity weight and this will most likely cause the WACC to rise and reduce the NPV. A lower operating margin assumption will reduce EBIT, which reduces each period's economic profit and ultimately reduces the NPV.

Rationale

✘ **operating margin declines.**
The net present value (NPV) will increase if the economic profit rises in any one period because NOPAT rises or $WACC falls or the WACC declines. A decline in the cost of equity will reduce the WACC, which causes the NPV to rise. Lower financial leverage does not benefit NOPAT because it is EBIT × (1 – tax rate) and EBIT is before interest. But, lower leverage indicates a higher equity weight and this will most likely cause the WACC to rise and reduce the NPV. A lower operating margin assumption will reduce EBIT, which reduces each period's economic profit and ultimately reduces the NPV.

Rationale

✘ **financial leverage declines.**
The net present value (NPV) will increase if the economic profit rises in any one period because NOPAT rises or $WACC falls or the WACC declines. A decline in the cost of equity will reduce the WACC, which causes the NPV to rise. Lower financial leverage does not benefit NOPAT because it is EBIT × (1 – tax rate) and EBIT is before interest. But, lower leverage indicates a higher equity weight and this will most likely cause the WACC to rise and reduce the NPV. A lower operating margin assumption will reduce EBIT, which reduces each period's economic profit and ultimately reduces the NPV.

Question 36
L2R23TB-AC018-1512
LOS: LOS-7400
Lesson Reference: Lesson 4: Other Income Measures and Valuation Models
Difficulty: medium
An analyst using multiple capital budgeting approaches is *most likely* correct if he uses the weighted average cost of capital (WACC) when calculating:

- both residual income and economic profit.
- economic profit and the cost of equity when calculating residual income.
- residual income and the cost of equity when calculating economic profit.

Rationale
both residual income and economic profit.
Residual income uses the cost of equity to find the equity charge to subtract from net income, while economic profit uses the WACC to determine a total capital charge to deduct from the net operating profit after tax (NOPAT).

Rationale
economic profit and the cost of equity when calculating residual income.
Residual income uses the cost of equity to find the equity charge to subtract from net income, while economic profit uses the WACC to determine a total capital charge to deduct from the net operating profit after tax (NOPAT).

Rationale
residual income and the cost of equity when calculating economic profit.
Residual income uses the cost of equity to find the equity charge to subtract from net income, while economic profit uses the WACC to determine a total capital charge to deduct from the net operating profit after tax (NOPAT).

Question 37
L2R23TB-AC021-1512
LOS: LOS-7400
Lesson Reference: Lesson 4: Other Income Measures and Valuation Models
Difficulty: medium

Next, Ideal, Inc. (NII) is investing in new equipment that will cost $20 million.

This new equipment will be fully depreciated using the straight-line method over four years. NII expects that the new equipment will increase sales by $11 million per year for four years and increase cash operating costs by $2 million per year for four years. The company's tax rate is 25 percent. At the end of four years, the equipment is expected to have a salvage value of $2 million. The company's cost of equity is 14 percent and its weighted average cost of capital is 10 percent. The economic profit for this project in Year 1 is *most likely*:

- less than $0.5 million.
- greater than $2.5 million.
- greater than $0.5 million and less than $2.5 million.

Rationale
less than $0.5 million.

The economic profit for any given year is calculated using the following formula:

$$\text{EP} = \text{NOPAT} - \$\text{WACC}$$

The NOPAT is net operating profit after tax, which equals EBIT × (1 – tax rate). The change in EBIT due to this project equals the increase in sales – the increase in cash operating costs – depreciation. The depreciation is $5 million ($20 million / 4) per year, because the equipment will be fully depreciated and the increases in sales and cash costs are given as being $11 million and $2 million. Finally, the tax rate is given as being 25 percent. Thus, NOPAT is calculated as follows:

$$\begin{aligned} \text{NOPAT in millions} &= (\text{S} - \text{C} - \text{Depr}) \times (1 - \text{tax rate}) = (\$11 - 2 - 5) \\ &\times (1 - 0.25) = \$3.0 \text{ million} \end{aligned}$$

The $WACC is the dollar cost of capital, which is the WACC × total capital invested (assets). In Year 1, the total invested is the initial $20 million investment and the WACC is given as being 10 percent. Therefore, the $WACC is:

$$\$\text{WACC} = \text{WACC} \times \text{total capital invested(assets)} = 0.10 \times \$20 \text{ million} = \$2 \text{ million}$$

Now, the EP can be calculated:

$$\text{EP} = \text{NOPAT} - \$\text{WACC} = \$3.0 \text{ million} - \$2.0 \text{ million} = \$1.0 \text{ million}$$

Rationale
greater than $2.5 million.

The economic profit for any given year is calculated using the following formula:

$$\text{EP} = \text{NOPAT} - \$\text{WACC}$$

The NOPAT is net operating profit after tax, which equals EBIT × (1 – tax rate). The change in EBIT due to this project equals the increase in sales – the increase in cash operating costs – depreciation. The depreciation is $5 million ($20 million / 4) per year because the equipment will be fully depreciated and the increases in sales and cash costs are given as being $11 million and $2 million. Finally, the tax rate is given as being 25 percent. Thus NOPAT is calculated as follows:

$$\begin{aligned} \text{NOPAT in millions} &= (\text{S} - \text{C} - \text{Depr}) \times (1 - \text{tax rate}) = (\$11 - 2 - 5) \\ &\times (1 - 0.25) = \$3.0 \text{ million} \end{aligned}$$

The $WACC is the dollar cost of capital, which is the WACC × total capital invested (assets). In year 1, the total invested is the initial $20 million investment and the WACC is given as being 10 percent. Therefore, the $WACC is:

$$\$\text{WACC} = \text{WACC} \times \text{total capital invested(assets)} = 0.10 \times \$20 \text{ million} = \$2 \text{ million}$$

Now, the EP can be calculated:

$$\text{EP} = \text{NOPAT} - \$\text{WACC} = \$3.0 \text{ million} - \$2.0 \text{ million} = \$1.0 \text{ million}$$

Rationale

greater than $0.5 million and less than $2.5 million.

The economic profit for any given year is calculated using the following formula:

$$\text{EP} = \text{NOPAT} - \$\text{WACC}$$

The NOPAT is net operating profit after tax, which equals EBIT × (1 – tax rate). The change in EBIT due to this project equals the increase in sales – the increase in cash operating costs – depreciation. The depreciation is $5 million ($20 million / 4) per year because the equipment will be fully depreciated and the increases in sales and cash costs are given as being $11 million and $2 million. Finally, the tax rate is given as being 25 percent. Thus NOPAT is calculated as follows:

$$\begin{aligned} \text{NOPAT in millions} &= (\text{S} - \text{C} - \text{Depr}) \times (1 - \text{tax rate}) = (\$11 - 2 - 5) \\ &\times (1 - 0.25) = \$3.0 \text{ million} \end{aligned}$$

The $WACC is the dollar cost of capital, which is the WACC × total capital invested (assets). In year 1, the total invested is the initial $20 million investment and the WACC is given as being 10 percent. Therefore, the $WACC is:

$$\$\text{WACC} = \text{WACC} \times \text{total capital invested(assets)} = 0.10 \times \$20 \text{ million} = \$2 \text{ million}$$

Now, the EP can be calculated:

$$\text{EP} = \text{NOPAT} - \$\text{WACC} = \$3.0 \text{ million} - \$2.0 \text{ million} = \$1.0 \text{ million}$$

Question 38

L2CF-TB0001-1412

LOS: LOS-7320

Lesson Reference: Lesson 2: Cash Flow Projections

Difficulty: medium

When performing capital budgeting appraisals, using an accelerated depreciation method verses straight-line depreciation for tax purposes will *most likely* result in:

- (●) Higher NPV.
- ( ) Lower NPV.
- ( ) No change in NPV.

Rationale

This Answer is Correct

An accelerated depreciation method will result in lower pretax profits in earlier years and, hence, lower taxes. This deferral in taxes will increase the NPV of the project.

Question 39
L2R23TB-AC017-1512
LOS: LOS-7350
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium
A project's NPV and IRR were determined, but before it could be funded the firm's cost of capital (its WACC) rose. An analyst is tasked with re-evaluating the project, given the new higher cost of capital. The analyst will *most likely* determine that the project's NPV has:

- decreased and its IRR has decreased.
- not changed and IRR has decreased.
- decreased and IRR has not changed.

Rationale
decreased and its IRR has decreased.
As cost of capital increases, NPV decreases. IRR is strictly determined by the cash flows of the project. Hence, IRR does not change as cost of capital changes.

Rationale
not changed and IRR has decreased.
As cost of capital increases, NPV decreases. IRR is strictly determined by the cash flows of the project. Hence, IRR does not change as cost of capital changes.

Rationale
decreased and IRR has not changed.
As cost of capital increases, NPV decreases. IRR is strictly determined by the cash flows of the project. Hence, IRR does not change as cost of capital changes.

Question 40
L2R23TB-ITEMSET-AC004-1512
LOS: LOS-7370
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium

Use the following information to answer the next three questions:

Lema Mashrek Corp (LMC) is considering expanding its distribution facilities. Demand is uncertain, hence, the expansion decision depends heavily on the expected level of sales after one year, and the sales are dependent on the economy's overall growth rate. The economy has recently had strong growth, but a growing number of forecasters are predicting slower future growth.

The company is evaluating a three-year project for new distribution equipment, with a required initial investment of $270,000. The equipment will be fully depreciated over its three-year life using the straight-line method. LMC's chief financial officer collected information about the project and has prepared the following table:

State of the economy (economic growth)	Slow Growth	Strong Growth
Probability	40 percent	60 percent
Expected sales	$230,000	$290,000
Cash costs	130,000	130,000
Salvage value of equipment at end of three years	0	0

The company has determined it has the option to sell the equipment at the end of the Year 1 for $200,000, but it will not be able to sell at any other time.

LMC's applicable tax rate is 30 percent and its overall cost of capital is 7.5 percent. The project is riskier than the company as whole. The CFO estimates that the project's required rate of return, which is consistent with the risk of the project, is 9.5 percent.

i.
The project's net present value (NPV), without considering the option to sell the equipment at end of Year 1, is *closest to*:

- –$31,200
- $36,600
- $47,800

Rationale

This Answer is Correct

To find the NPV without the option, the after-tax operating cash flows (OCF) for each year and terminal year non-operating cash flows (TNOCF) are needed for each state of the economy:

$$\mathrm{OCF_{Slow}} = (\mathrm{S} - \mathrm{C} - \mathrm{D})(1 - \mathrm{T}) + \mathrm{D} = \left(230{,}000 - 130{,}000 - \frac{270{,}000}{3}\right)(1 - 0.30) + \frac{270{,}000}{3} = 97{,}000$$

$$\mathrm{TNOCF_{Slow}} = \mathrm{Sal_T} + \mathrm{NWCInv} - \mathrm{T}(\mathrm{Sal_T} - \mathrm{B_T}) = \$0 + 0 - 0.30(0 - 0) = 0$$

$$\mathrm{OCF_{Strong}} = (\mathrm{S} - \mathrm{C} - \mathrm{D})(1 - \mathrm{T}) + \mathrm{D} = \left(290{,}000 - 130{,}000 - \frac{270{,}000}{3}\right)(1 - 0.30) + \frac{270{,}000}{3} = 139{,}000$$

$$\mathrm{TNOCF_{Strong}} = \mathrm{Sal_T} + \mathrm{NWCInv} - \mathrm{T}(\mathrm{Sal_T} - \mathrm{B_T}) = \$0 + 0 - 0.30(0 - 0) = 0$$

Next, the weighted average expected cash flow for each year is calculated using the probabilities for the economic environments:

$$\text{Weighted average expected cash flow per year} = \text{Cash flows}_{\text{Slow}} \times \text{Probability}_{\text{Slow}} + \text{Cash flows}_{\text{Strong}} \times \text{Prob}$$

$$\text{Weighted average expected cash flow in Years 1 and 2} = \$97{,}000 \times 0.40 + \$139{,}000 \times 0.60 = \$122{,}200$$

$$\text{Weighted average expected cash flow in Year 3} = (\$97{,}000 + 0) \times 0.40 + (\$139{,}000 + 0) \times 0.60 = \$122{,}200$$

These weighted average cash flows are discounted at the 9.5 percent discount rate that is commensurate with the project's risk in order to find the project's NPV:

$$\text{NPV} = -\$270{,}000 + \frac{122{,}200}{(1+0.095)^1} + \frac{122{,}200}{(1+0.095)^2} + \frac{122{,}200}{(1+0.095)^3} = \$36{,}588$$

Rationale

This Answer is Correct

To find the NPV without the option, the after-tax operating cash flows (OCF) for each year and terminal year non-operating cash flows (TNOCF) are needed for each state of the economy:

$$\text{OCF}_{\text{Slow}} = (\text{S} - \text{C} - \text{D})(1 - \text{T}) + \text{D} = \left(230{,}000 - 130{,}000 - \frac{270{,}000}{3}\right)(1 - 0.30) + \frac{270{,}000}{3} = 97{,}000$$

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$$\text{OCF}_{\text{Strong}} = (\text{S} - \text{C} - \text{D})(1 - \text{T}) + \text{D} = \left(290{,}000 - 130{,}000 - \frac{270{,}000}{3}\right)(1 - 0.30) + \frac{270{,}000}{3} = 139{,}000$$

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$$\text{NPV} = -\$270{,}000 + \frac{122{,}200}{(1+0.095)^1} + \frac{122{,}200}{(1+0.095)^2} + \frac{122{,}200}{(1+0.095)^3} = \$36{,}588$$

Rationale

This Answer is Correct

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$$\text{OCF}_{\text{Slow}} = (\text{S} - \text{C} - \text{D})(1 - \text{T}) + \text{D} = \left(230{,}000 - 130{,}000 - \frac{270{,}000}{3}\right)(1 - 0.30) + \frac{270{,}000}{3} = 97{,}000$$

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Next, the weighted average expected cash flow for each year is calculated using the probabilities for the economic environments:

$$\text{Weighted average expected cash flow per year} = \text{Cash flows}_{\text{Slow}} \times \text{Probability}_{\text{Slow}} + \text{Cash flows}_{\text{Strong}} \times \text{Prob}$$

$$\text{Weighted average expected cash flow in Years 1 and 2} = \$97{,}000 \times 0.40 + \$139{,}000 \times 0.60 = \$122{,}200$$

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These weighted average cash flows are discounted at the 9.5 percent discount rate that is commensurate with the project's risk in order to find the project's NPV:

$$\text{NPV} = -\$270{,}000 + \frac{122{,}200}{(1 + 0.095)^1} + \frac{122{,}200}{(1 + 0.095)^2} + \frac{122{,}200}{(1 + 0.095)^3} = \$36{,}588$$

ii.

The type of real option associated with the distribution expansion project is *most likely* a:

- (●) sizing option.
- ( ) timing option.
- ( ) flexibility option.

Rationale

This Answer is Incorrect

After one year, the company can abandon the project and sell the equipment if the economic growth is slow. This is a sizing option, which is an option allowing a company to materially change the scale of a project, including expanding, shrinking, or abandoning it.

Rationale

This Answer is Incorrect

After one year, the company can abandon the project and sell the equipment if the economic growth is slow. This is a sizing option, which is an option allowing a company to materially change the scale of a project, including expanding, shrinking, or abandoning it.

Rationale

This Answer is Incorrect

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iii.

If the option to sell the equipment at the end of Year 1 is considered, then project's NPV is *closest to*:

- 39,400
- 43,300
- 45,500

Rationale

This Answer is Incorrect

The best way to approach this problem is to determine the NPV under each economic state and then weight these NPVs to generate an overall NPV. If the economy is slow, the company has the choice of continuing the project and getting cash flows for two more years or selling the machine for $200,000. Each of these two options, the cash flows and their present values at the end of Year 1, are calculated below:

Continue project:

$$\text{OCF}_{\text{Slow}} = (\text{S} - \text{C} - \text{D})(1 - \text{T}) + \text{D} = \left(230{,}000 - 130{,}000 - \frac{270{,}000}{3}\right)(1 - 0.30) + \frac{270{,}000}{3} = 97{,}000$$

$$\text{TNOCF}_{\text{Slow}} = \text{Sal}_{\text{T}} + \text{NWCInv} - \text{T}(\text{Sal}_{\text{T}} - \text{B}_{\text{T}}) = \$0 + 0 - 0.30(0 - 0) = 0$$

$$\text{PV}_{\text{End of Year1}} = \frac{97{,}000}{(1 + 0.095)^1} + \frac{97{,}000}{(1 + 0.095)^2} = \$169{,}484$$

Abandon project:

$$\begin{aligned}\text{After-tax sale CFs} &= \text{Selling price (SP)} - \text{T}(\text{SP} - \text{B}_{\text{T}}) \\ &= \$200{,}000 - 0.30(200{,}000 - \left(270{,}000 - \tfrac{270{,}000}{3}\right) = \$194{,}000\end{aligned}$$

$$\text{PV}_{\text{End of Year 1}} = \text{After-tax sale proceeds} = \$194{,}000$$

It is clearly valuable to have the option to abandon the project if the economic growth is slow. The NPV of the project if the economic growth is slow is calculated as follows:

$$\text{NPV} = -\$270{,}000 + \frac{97{,}000 + 194{,}000}{(1 + 0.095)^1} = -\$4{,}247$$

If the economy is strong, the company still has the choice of continuing the project and getting cash flows for two more years or selling the machine for $200,000. Each of these two options, the cash flows and their present values at the end of Year 1, are calculated below:

Continue project:

$$\text{OCF}_{\text{Strong}} = (\text{S} - \text{C} - \text{D})(1 - \text{T}) + \text{D} = \left(290{,}000 - 130{,}000 - \frac{270{,}000}{3}\right)(1 - 0.30) + \frac{270{,}000}{3} = 139{,}000$$

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$$\text{PV}_{\text{End of year 1}} = \frac{139{,}000}{(1 + 0.095)^1} + \frac{139{,}000}{(1 + 0.095)^2} = \$242{,}868$$

Abandon project:

$$\begin{aligned}\text{After-tax sale CFs} &= \text{Selling price(SP)} - T\left(\text{SP} - B_T\right)\\ &= \$200{,}000 - 0.30(200{,}000 - \left(270{,}000 - \tfrac{270{,}000}{3}\right) = \$194{,}000\end{aligned}$$

$$\text{PV}_{\text{End of Year 1}} = \text{After-tax sale proceeds} = \$194{,}000$$

In this case, the company is better off if they continue the project for all three years if the economic growth is strong. The NPV of the project if the economic growth is strong is calculated as follows:

$$\text{NPV} = -\$270{,}000 + \frac{139{,}000}{(1+0.095)^1} + \frac{139{,}000}{(1+0.095)^2} + \frac{139{,}000}{(1+0.095)^3} = \$78{,}738$$

The last step is to find the weighted NPV for the project:

$$\text{Weighted NPV} = \text{NPV}_{\text{Slow}} \times \text{Probability}_{\text{Slow}} + \text{NPV}_{\text{Strong}} \times \text{Probability}_{\text{Strong}}$$

$$\text{Weighted NPV} = -\$4{,}247 \times 0.40 + \$78{,}738 \times 0.60 = \$45{,}544$$

Rationale

This Answer is Incorrect

The best way to approach this problem is to determine the NPV under each economic state and then weight these NPVs to generate an overall NPV. If the economy is slow, the company has the choice of continuing the project and getting cash flows for two more years or selling the machine for $200,000. Each of these two options, the cash flows and their present values at the end of Year 1, are calculated below:

Continue project:

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Rationale

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The best way to approach this problem is to determine the NPV under each economic state and then weight these NPVs to generate an overall NPV. If the economy is slow, the company has the choice of continuing the project and getting cash flows for two more years or selling the machine for $200,000. Each of these two options, the cash flows and their present values at the end of Year 1, are calculated below:

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Abandon project:

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Continue project:

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In this case, the company is better off if they continue the project for all three years if the economic growth is strong. The NPV of the project if the economic growth is strong is calculated as follows:

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The last step is to find the weighted NPV for the project:

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Question 41
L2R23TB-AC008-1512
LOS: LOS-7320
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium
Nesrin Open Technologies (NOT) plans to replace one of its servers with a more recent model. The existing machine can be sold for $85,000 today and its book value is $75,000. Annually, it costs $105,715 to operate the existing machine, not counting depreciation, and the expected salvage value in five years is $25,000 for the old machine. The new machine will cost $70,000 per year to operate (excluding depreciation) and its purchase price, including shipping and installation, is $200,000. Its annual depreciation expense will be $10,000, compared to $12,500 for the existing machine. The new machine will require an increase in inventories of $10,000. After five years, the new machine will be sold for its book value of $150,000. The firm's cost of capital is 10 percent and its marginal tax rate is 30 percent. The first year's after-tax operating cash flow for this project is *closest to*:

- $25,000
- $24,250
- $22,500

Rationale
$25,000

The first year's after-tax operating cash flow is calculated as follows:

$$\begin{aligned} \text{OCF}_{\text{Incr}} &= (\Delta\text{S} - \Delta\text{C} - \Delta\text{DEPR})(1 - t) + \Delta\text{DEPR} \\ &= [\$0 - (70{,}000 - 105{,}715) - (10{,}000 - 12{,}500)]\,(1 - 0.30) + (10{,}000 - 12{,}500) \\ &= \$24{,}250 \end{aligned}$$

Note that there is no change in sales, just operating expense savings.

Rationale
$24,250

The first year's after-tax operating cash flow is calculated as follows:

$$\begin{aligned} \text{OCF}_{\text{Incr}} &= (\Delta\text{S} - \Delta\text{C} - \Delta\text{DEPR})(1 - t) + \Delta\text{DEPR} \\ &= [\$0 - (70{,}000 - 105{,}715) - (10{,}000 - 12{,}500)]\,(1 - 0.30) + (10{,}000 - 12{,}500) \\ &= \$24{,}250 \end{aligned}$$

Note that there is no change in sales, just operating expense savings.

Rationale
$22,500

The first year's after-tax operating cash flow is calculated as follows:

$$\begin{aligned} \text{OCF}_{\text{Incr}} &= (\Delta\text{S} - \Delta\text{C} - \Delta\text{DEPR})(1 - t) + \Delta\text{DEPR} \\ &= [\$0 - (70{,}000 - 105{,}715) - (10{,}000 - 12{,}500)]\,(1 - 0.30) + (10{,}000 - 12{,}500) \\ &= \$24{,}250 \end{aligned}$$

Note that there is no change in sales, just operating expense savings.

Question 42
L2R23TB-AC009-1512
LOS: LOS-7320
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium
Nesrin Open Technologies (NOT) plans to replace one of its servers with a more recent model. The existing machine can be sold for $85,000 today and its book value is $75,000. Annually it costs $105,715 to operate the existing machine, not counting depreciation, and the expected salvage value in five years is $25,000 for the old machine. The new machine will cost $70,000 per year to operate (excluding depreciation) and its purchase price, including shipping and installation, is $200,000. Its annual depreciation expense will be $10,000, compared to $12,500 for the existing machine. The new machine will require an increase in inventories of $10,000. After five years, the new machine will be sold for its book value of $150,000. The firm's cost of capital is 10 percent and its marginal tax rate is 30 percent. The terminal year (Year 5) after-tax nonoperating cash flow is *closest* to:

- $131,250
- $138,750
- $160,000

Rationale
$131,250
A the end of five years, the old machine will have a book value of $12,500 ($75,000 current book value – 5 × $12,500 in annual depreciation). The new machine's book value in five years will be $150,000 ($200,000 cost – 5 × $10,000 in annual depreciation). The terminal year (Year 5) nonoperating cash flows are calculated as follows:

$$\begin{aligned}\text{TNOCF}_{\text{Incr.}} &= \Delta\text{Sal}_T + \Delta\text{WC Inv} - (\Delta\text{Sal}_T - \Delta\text{B}_T)(t) \\ &= (\$150{,}000 - 25{,}000) + 10{,}000 - [(\$150{,}000 - 25{,}000) - (150{,}000 - 12{,}500)](0.30) \\ &= \$138{,}750\end{aligned}$$

Rationale
$138,750
A the end of five years, the old machine will have a book value of $12,500 ($75,000 current book value – 5 × $12,500 in annual depreciation). The new machine's book value in five years will be $150,000 ($200,000 cost – 5 × $10,000 in annual depreciation). The terminal year (Year 5) nonoperating cash flows are calculated as follows:

$$\begin{aligned}\text{TNOCF}_{\text{Incr.}} &= \Delta\text{Sal}_T + \Delta\text{WC Inv} - (\Delta\text{Sal}_T - \Delta\text{B}_T)(t) \\ &= (\$150{,}000 - 25{,}000) + 10{,}000 - [(\$150{,}000 - 25{,}000) - (150{,}000 - 12{,}500)](0.30) \\ &= \$138{,}750\end{aligned}$$

Rationale
$160,000
A the end of five years, the old machine will have a book value of $12,500 ($75,000 current book value – 5 × $12,500 in annual depreciation). The new machine's book value in five years will be $150,000 ($200,000 cost – 5 × $10,000 in annual depreciation). The terminal year (Year 5) nonoperating cash flows are calculated as follows:

$$\begin{aligned}
\text{TNOCF}_{\text{Incr.}} &= \Delta\text{Sal}_T + \Delta\text{WC Inv} - (\Delta\text{Sal}_T - \Delta\text{B}_T)(t) \\
&= (\$150{,}000 - 25{,}000) + 10{,}000 - [(\$150{,}000 - 25{,}000) - (150{,}000 - 12{,}500)](0.30) \\
&= \$138{,}750
\end{aligned}$$

Question 43
L2R23TB-AC015-1512
LOS: LOS-7380
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium
A *most likely* example of a common capital budgeting pitfall is:

- using NPV rather than IRR to evaluate mutually exclusive projects.
- rejecting projects with high NPV in favor of projects that provide favorable short-term accounting profits.
- adjusting project cash flows for the effect of new competition entering a market after a firm introduces a profitable project.

Rationale
using NPV rather than IRR to evaluate mutually exclusive projects.
Normally managers may have an incentive to raise short-term profitability metrics such as EPS, ROE, and ROA. Thus, they may prefer projects with lower NPVs and higher short-term profitability.

Rationale
rejecting projects with high NPV in favor of projects that provide favorable short-term accounting profits.
Normally managers may have an incentive to raise short-term profitability metrics such as EPS, ROE, and ROA. Thus, they may prefer projects with lower NPVs and higher short-term profitability.

Rationale
adjusting project cash flows for the effect of new competition entering a market after a firm introduces a profitable project.
Normally managers may have an incentive to raise short-term profitability metrics such as EPS, ROE, and ROA. Thus, they may prefer projects with lower NPVs and higher short-term profitability.

Question 44
L2R23TB-AC026-1512
LOS: LOS-7320
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium
An analyst at Farouqi, Inc. has determined that a project's net present value (NPV) is $12.6 million. This NPV is based on using accelerated depreciation, as is allowed for taxes and financial statements. But, before it can fund the project, the government bans the use of accelerated depreciation for tax purposes and instead requires that straight-line depreciation be used. The new rule does not affect what depreciation method is used for financial statement reporting. When the analyst recalculates the project's NPV, she will *most likely* determine that the project's NPV is:

- not affected because accelerated depreciation can still be used for financial statements.
- higher than the original NPV of $12.6 million.
- lower than the original NPV of $12.6 million.

Rationale
not affected because accelerated depreciation can still be used for financial statements.
The tax allowed depreciation is what affects the cash flows, not the depreciation method used for financial statement reporting. Straight-line will reduce the depreciation in early years relative to an accelerated depreciation method; but, over the entire life of a machine, the total depreciation is the same as higher relative levels of depreciation occur in later years under the straight-line method. Higher depreciation in early years improves a project's NPV because it reduces taxes sooner, and the time value of money makes these savings worth more than later savings. Thus, by not allowing accelerated depreciation for the tax purposes, the government's change has caused the NPV of the project to fall.

Rationale
higher than the original NPV of $12.6 million.
The tax allowed depreciation is what affects the cash flows, not the depreciation method used for financial statement reporting. Straight-line will reduce the depreciation in early years relative to an accelerated depreciation method; but, over the entire life of a machine, the total depreciation is the same as higher relative levels of depreciation occur in later years under the straight-line method. Higher depreciation in early years improves a project's NPV because it reduces taxes sooner, and the time value of money makes these savings worth more than later savings. Thus, by not allowing accelerated depreciation for the tax purposes, the government's change has caused the NPV of the project to fall.

Rationale
lower than the original NPV of $12.6 million.
The tax allowed depreciation is what affects the cash flows, not the depreciation method used for financial statement reporting. Straight-line will reduce the depreciation in early years relative to an accelerated depreciation method; but, over the entire life of a machine, the total depreciation is the same as higher relative levels of depreciation occur in later years under the straight-line method. Higher depreciation in early years improves a project's NPV because it reduces taxes sooner, and the time value of money makes these savings worth more than later savings. Thus, by not allowing accelerated depreciation for the tax purposes, the government's change has caused the NPV of the project to fall.

Question 45
L2R23TB-AC033-1512
LOS: LOS-7400
Lesson Reference: Lesson 4: Other Income Measures and Valuation Models
Difficulty: medium
Jude Fashion Styles (JFS) plans to invest $90 million in tailoring equipment that will be depreciated on a straight-line basis to a zero salvage value over 10 years and this depreciation is included in operating expenses. The equipment is expected to increase net operating income (EBIT) by $60 million annually. JFS's tax rate is 40 percent. The company's weighted average cost of capital is 12 percent and its cost of equity is 16 percent. The economic profit for Year 1 is *closest to*:

- $19.8 million.
- $21.6 million.
- $25.2 million.

Rationale
$19.8 million.

The economic profit for any given year is calculated using the following formula:

$$\text{EP} = \text{NOPAT} - \$\text{WACC}$$

The NOPAT is net operating profit after tax, which equals EBIT × (1 – tax rate). The $60 million in net operating profit is net of depreciation. Thus, the NOPAT is $60 million × (1 – 0.40) = $36 million.

The $WACC is the dollar cost of capital, which is the WACC × total capital invested (assets). In Year 1, the total invested is the initial $90 million investment and the WACC is given as being 12 percent. Therefore, the $WACC is:

$$\begin{aligned}\$\text{WACC} &= \text{WACC} \times \text{total capital invested(assets)} = 0.12 \times \$90 \text{ million} \\ &= \$10.8 \text{ million}\end{aligned}$$

Now, the EP can be calculated:

$$\text{EP} = \text{NOPAT} - \$\text{WACC} = \$36.0 \text{ million} - 10.8 \text{ million} = \$25.2 \text{ million}$$

Rationale
$21.6 million.

The economic profit for any given year is calculated using the following formula:

$$\text{EP} = \text{NOPAT} - \$\text{WACC}$$

The NOPAT is net operating profit after tax, which equals EBIT × (1 – tax rate). The $60 million in net operating profit is net of depreciation. Thus, the NOPAT is $60 million × (1 – 0.40) = $36 million.

The $WACC is the dollar cost of capital, which is the WACC × total capital invested (assets). In year 1, the total invested is the initial $90 million investment and the WACC is given as being 12 percent. Therefore, the $WACC is:

$$\begin{aligned}\$\text{WACC} &= \text{WACC} \times \text{total capital invested(assets)} = 0.12 \times \$90 \text{ million} \\ &= \$10.8 \text{ million}\end{aligned}$$

Now, the EP can be calculated:

$$\text{EP} = \text{NOPAT} - \$\text{WACC} = \$36.0\,\text{million} - 10.8\,\text{million} = \$25.2\,\text{million}$$

Rationale

$25.2 million.

The economic profit for any given year is calculated using the following formula:

$$\text{EP} = \text{NOPAT} - \$\text{WACC}$$

The NOPAT is net operating profit after tax, which equals EBIT × (1 – tax rate). The $60 million in net operating profit is net of depreciation. Thus, the NOPAT is $60 million × (1 – 0.40) = $36 million.

The $WACC is the dollar cost of capital, which is the WACC × total capital invested (assets). In year 1, the total invested is the initial $90 million investment and the WACC is given as being 12 percent. Therefore, the $WACC is:

$$\begin{aligned}\$\text{WACC} = \text{WACC} \times \text{total capital invested(assets)} &= 0.12 \times \$90\,\text{million} \\ &= \$10.8\,\text{million}\end{aligned}$$

Now, the EP can be calculated:

$$\text{EP} = \text{NOPAT} - \$\text{WACC} = \$36.0\,\text{million} - 10.8\,\text{million} = \$25.2\,\text{million}$$

Question 46
L2R23TB-AC007-1512
LOS: LOS-7320
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium
Nesrin Open Technologies (NOT) plans to replace one of its servers with a more recent model. The existing machine can be sold for $85,000 today and its book value is $75,000. Annually, it costs $105,715 to operate the existing machine, not counting depreciation, and the expected salvage value in five years is $25,000 for the old machine. The new machine will cost $70,000 per year to operate (excluding depreciation) and its purchase price, including shipping and installation, is $200,000. Its annual depreciation expense will be $10,000, compared to $12,500 for the existing machine. The new machine will require an increase in inventories of $10,000. After five years, the new machine will be sold for its book value of $150,000. The firm's cost of capital is 10 percent and its marginal tax rate is 30 percent. The initial investment outlay of this project is *closest to*:

- (●) $128,000
- ( ) $125,000
- ( ) $118,000

Rationale
$128,000
The initial outlay is calculated as follows:

$$\begin{aligned} \text{Initial Outlay} &= \text{FC Inv} + \text{WC Inv} - \text{Sal}_0 + (\text{Sal}_0 - \text{B}_0)(t) \\ &= \$200{,}000 + 10{,}000 - 85{,}000 + (85{,}000 - 75{,}000)(0.30) = \$128{,}000 \end{aligned}$$

Rationale
$125,000
The initial outlay is calculated as follows:

$$\begin{aligned} \text{Initial Outlay} &= \text{FC Inv} + \text{WC Inv} - \text{Sal}_0 + (\text{Sal}_0 - \text{B}_0)(t) \\ &= \$200{,}000 + 10{,}000 - 85{,}000 + (85{,}000 - 75{,}000)(0.30) = \$128{,}000 \end{aligned}$$

Rationale
$118,000
The initial outlay is calculated as follows:

$$\begin{aligned} \text{Initial Outlay} &= \text{FC Inv} + \text{WC Inv} - \text{Sal}_0 + (\text{Sal}_0 - \text{B}_0)(t) \\ &= \$200{,}000 + 10{,}000 - 85{,}000 + (85{,}000 - 75{,}000)(0.30) = \$128{,}000 \end{aligned}$$

Question 47
L2R23TB-AC012-1512
LOS: LOS-7350
Lesson Reference: Lesson 3: Project Analysis and Evaluation
Difficulty: medium
The project risk analysis that *most likely* produces a normal distribution of expected returns is:

- scenario analysis.
- sensitivity analysis.
- Monte Carlo simulation.

Rationale
scenario analysis.
Monte Carlo simulation uses a computer program to simulate outcomes within assigned probable ranges for each variable. Those variables include unit sales, sale price, variable costs, cost of capital, etc. Because each variable is assumed to have its own probability distribution, project NPVs and IRRs will have a probability distribution.

Rationale
sensitivity analysis.
Monte Carlo simulation uses a computer program to simulate outcomes within assigned probable ranges for each variable. Those variables include unit sales, sale price, variable costs, cost of capital, etc. Because each variable is assumed to have its own probability distribution, project NPVs and IRRs will have a probability distribution.

Rationale
Monte Carlo simulation.
Monte Carlo simulation uses a computer program to simulate outcomes within assigned probable ranges for each variable. Those variables include unit sales, sale price, variable costs, cost of capital, etc. Because each variable is assumed to have its own probability distribution, project NPVs and IRRs will have a probability distribution.

Question 48
L2FR-ITEMSET-PQ2201-1411
LOS: LOS-7320
Lesson Reference: Lesson 2: Cash Flow Projections
Difficulty: medium

Use the following information to answer the next four questions:

Motako Inc. is considering an investment in a new machine. The machine costs $560,000 and an additional $70,000 is required to install it. It has a useful life of five years, after which it will be sold for $65,000. The company's management has decided to depreciate the machine using the straight-line method over its useful life to a book value of zero. An inventory investment of $60,000 is also required. The machine is expected to generate additional revenues of $320,000 annually, and is also expected to reduce the company's annual cash operating expenses by $30,000.

Motako Inc. is in the 35% tax bracket and its cost of capital is 10%.

i.
The total amount of initial investment the company is required to make is *closest* to:

- $620,000
- **$690,000**
- $630,000

Rationale
This Answer is Correct

Initial investment = FCInv + NWCInv

Initial investment = (560,000 + 70,000) + 60,000 = $690,000

ii.
After-tax operating cash flow in Year 1 is *closest* to:

- $266,700
- $232,600
- **$271,600**

Rationale
This Answer is Correct

After-tax operating cash flow = (S − C − D) (1 − t) + D

After-tax operating cash flow = [320,000 − (−30,000) − 126,000] (1 − 0.35) + 126,000

After-tax operating cash flow = $271,600

iii.
The fifth year's after-tax cash flow is *closest to*:

- **$373,850**
- $336,600

○ $368,950

Rationale

This Answer is Correct

Terminal year after-tax nonoperating cash flow = $Sal_T + NWCInv - t\ (Sal_T - BV_T)$

Terminal year after-tax nonoperating cash flow = 65,000 + 60,000 − 0.35 (65,000 − 0)

Terminal year after-tax nonoperating cash flow = $102,250

Terminal year after-tax operating cash flow = (S − C − D) (1 − t) + D

Terminal year after-tax operating cash flow = (320,000 + 30,000 − 126,000) (1 − 0.35) + 126,000 = $271,600

Total after-tax cash flow = $102,250 + $271,600 = $373,850

iv.

The net present value (NPV) of the investment is *closest to*:

○ $451,024

◉ $403,067

○ $255,226

Rationale

This Answer is Correct

Initial investment outlay = $690,000

Annuity of $271,600 for five years

A single payment of $102,250 at the end of Year 5

Therefore, NPV is calculated as:

[CF] [2^{ND}] [CE|C]

690,000 [+/−] [Enter] [↓]

271,600 [Enter] [↓]

4 [Enter] [↓]

373,850 [Enter]

[NPV] 10 [Enter] [↓] [CPT]

NPV = $403,066.89