TUTORIAL 3 Solution

1. En Jaya

a. Discount factor for 12 years at 8% is $= 1 / (1 + i)^{n}$
$= 1/ (1 + 8\%)^{12}$
$= 0.397$

The amount need to invest now is $= 4{,}000 \times 0.397$
$= RM1588$

b. Discount factor for 12 years at 10% $= 1 / (1 + i)^{n}$
$= 1/ (1 + 12\%)^{12}$
$= 0.257$

The amount need to invest now $= 4{,}000 \times 0.257$
$= RM1028$

2. Chong Family

a. Discount factor for 5 years at 8% $= [1 – 1/(1+i)^{n}] / i$
$= [1 – 1/(1+ 8\%)^{5}] / 8\%$
$= 3.993$

The amount need to invest now $= 1{,}000 \times 3.993$
$= RM3993$

b. From the Table IV, discount factor for 5 years at 10% $= 3.605$

The amount need to invest now $= 1{,}000 \times 3.605$
$= RM3605$

3. Cyber Community College

Acquisition cost of new server	$65,500
Salvage of old server	(11,500)
Net cash outflow at time 0	$54,000

Annuity discount factor associated with the internal rate of return

$$= \frac{\text{net cash outflow at time 0}}{\text{annual savings if new server is purchased}}$$

$$= \frac{\$54{,}000}{\$14{,}000} = 3.857 \text{ (rounded)}$$

In row (5) of Table IV in the Appendix, 3.857 falls between the annuity discount factors in the 8 percent and 10 percent columns. Thus, the project's internal rate of return lies between 8 percent and 10 percent. We need to interpolate as follows:

		Annuity Discount Factor from Table IV	
Difference is 2%	8%	3.993	3.993
	True IRR		3.857
	10%	3.791	
	Difference	.202	.136

$$\text{Internal rate of return} = 8\% + \left(\frac{.136}{.202}\right)(2\%) = 9.35\% \text{ (rounded)}$$

The project's internal rate of return is approximately 9.35 percent.

4. (I) JACK & JILL

Cost of new well (time 0)	$(2,825)
Present value of annual savings: ($500 × 6.710*)	3,355
Net present value	$ 530

* r = .08 and n = 10.

The governing board should approve the new well, because the project's net present value is positive.

ANSWER 4(II)

$$\text{Annuity discount factor associated with the internal rate of return} = \frac{\textbf{initial cash outflow}}{\textbf{annual cost savings}}$$

$$= \frac{\$2{,}825}{\$500} = 5.650$$

Find 5.650 in the 10-year row of Table IV in the Appendix. This annuity discount factor falls in the 12 percent column. Thus, the project's internal rate of return is 12 percent. The governing board should approve the new well, because the project's internal rate of return is greater than the hurdle rate of 8 percent

5. Wang Bank Bhd

1. Payback period $= \dfrac{\textbf{initial investment}}{\textbf{annual after-tax cash flow}}$

$$= \frac{\$124{,}200}{\$27{,}000} = 4.6 \text{ years}$$

2. Net-present-value analysis**:**

	Discount Rate		
	10%	12%	14%
Present value of after-tax savings:			
$27,000 × 4.868*	$131,436		
$27,000 × 4.564*		$123,228	
$27,000 × 4.288*			$115,776
Initial investment	(124,200)	(124,200)	(124,200)
Net present value	$ 7,236	$ (972)	$ (8,424)

* r = .10; r = .12; r = .14

The management of Wang Bank Bhd should install ATM machines at 10% interest rate, because the net present value is positive at 10%.

6. City Hospital

1. Net Present Value
From the present value annuities, the discount factor for 10years at 14% = 5.216

Initial investment (cash outflow)	=$(110,000)
Cash savings 28,000 x 5.216	= 146,048
Net present value	= 36,048

2. Payback Period = Initial investment / annual cash savings
= 110,000/ 28,000
= 3.93 years

3. Internal Rate of Return = Initial investment (cash outflow) / annual cash savings
= 110,000 / 28,000
= 3.923

Interpolation can be used to determine the exact rate:

	Present Value Factors	
20%	4.192	4.192
IRR rate	-----	3.929
22%	3.923	----
Difference	0.269	0.263

Internal Rate of Return = 20% + [0.263/0.269] (2%)
= 20% + 1.96%
= 21.96%

4. Accrual Accounting Rate of Return:

Net initial investment	= 110,000
Estimated useful life	= 10years
Annual expense (depreciation)	=11,000

Accounting Rate of Return = Incremental revenue - Incremental expense / Initial investment

= 28,000 - 11,000 / 110,000

= 15.46%