LA TROBE UNIVERSITY

SEMESTER ONE EXAMINATION PERIOD

2011

FIN5EQS EQUITY SECURITIES

SOLUTIONS TO SAMPLE EXAM QUESTIONS

SAMPLE SECTION A (Multiple Choice) QUESTIONS

The following information relates to Questions 1 – 6.

Jacob Daniel is the chief investment officer at a U.S. pension fund sponsor, and Steven Rae is an analyst for the pension fund who follows consumer/non-cyclical stocks. At the beginning of the 2009, Daniel asks Rae to value the equity of Tasty Foods Company for its possible inclusion in the list of approved investments. Tasty Foods Company is involved in the production of frozen foods that are sold under its own brand name to retailers.

Rae is considering if a dividend discount mode would be appropriate for valuing Tasty Foods. He has complied the information in the following table for the company's EPS and DPS during the last five years. The quarterly dividends paid by the company have been added to arrive at the annual dividends. Rae has also computed the dividend payout ratio for each year as DPS/EPS and the growth rates in EPS and DPS.

Year	EPS ($)	DPS ($)	Payout Ratio	Growth in EPS (%)	Growth in DPS (%)
2008	2.12	0.59	0.278	2.9	3.5
2007	2.06	0.57	0.277	2.5	5.6
2006	2.01	0.54	0.269	6.3	5.9
2005	1.89	0.51	0.270	6.2	6.3
2004	1.78	0.48	0.270		

Rae notes that the EPS of the company has been increasing at an average rate of 4.48% per year. The dividend payout ratio has remained fairly stable and dividends have increased at an average rate of 5.3%. In view of a history of dividend payments by the company and the understandable relationship dividend policy bears to the company's earnings, Rae concludes that the DDM is appropriate to value the equity of Tasty Foods. Further, he expects the moderate growth rate of the company to persist and decides to use the Gordon growth model.

Rae uses the CAPM to compute the return on equity. He uses the annual yield of 4% on the 10-year Treasury bond as the risk-free return. He estimates the expected U.S. equity risk premium, with the S&P 500 Index used as a proxy for the market, to be 6.5% per year. The estimated beta of Tasty foods against the S%P 500 Index is 1.10. Accordingly, Rae's

estimate for the required return on equity for Tasty Foods, is 0.4 + 1.10(0.065) = 0.1115 or 11.15%.

Using the past growth rate in dividends of 5.3% as his estimate of the future growth rate in dividends, Rae computes the value of Tasty Foods stock. He shows his analysis to Alex Renteria, his colleague at the pension fund who specialises in the frozen foods industry. Renteria concurs with the valuation approach used by Rae but disagrees with the future growth rate he used. Renteria believes that the stock's current price of $8.42 is the fair value of the stock.

1. Which of the following is *closest* to Rae's estimate of the stock's value?
   A. $10.08
   B. $10.54
   C. $10.62

$$V_0 = \frac{D_1}{r-g} = \frac{(0.59)(1+0.0530)}{0.1115-0.0530} = \$10.62$$

2. What is the stock's justified P/E based on the stock's value estimated by Rae?
   A. 5.01
   B. 5.24
   C. 5.27

$$\text{Justified trailing P/E} = \frac{P_0}{V_0} = \frac{10.62}{2.12} = 5.01$$

3. Rae considers a security trading with a band of ±10% of his estimate of intrinsic value to be with a "fair value range". By that criterion, the stock of Tasty Foods is:
   A. undervalued
   B. fairly valued
   C. overvalued

   The trading band indicating fair value = 10.62 ± 1.06 = $9.56 to $11.68. Since the current of $8.42 is below the bottom of the band, the stock is undervalued.

4. The beta of Tasty Foods stock of 1.10 used by Rae in computing the required return on equity was based on monthly returns for the last 10 years. If Rae uses daily returns for the last 5 years, the beta estimate is 1.25. If a beta of 1.25 is used, what would be Rae's estimate of the value of the stock of Tasty Foods?
   A. $8.64
   B. $9.10
   C. $20.13

$$r = R_F + \beta\left(E\left(R_M\right) - R_F\right) = 0.04 + 1.25(0.065) = 12.13\%$$

$$V_0 = \frac{D_1}{r-g} = \frac{0.59(1+0.0530)}{0.1213-0.0530} = \$9.10$$

5. Alex Renteria has suggested that the market price of Tasty Foods stock is its fair value. What is the implied growth rate of dividends given the stock's market price? Use the required return on equity base don a beta of 1.10.
   A. 3.87%
   B. 5.30%
   C. 12.1%

$$V_0 = 8.42 = \frac{D_1}{r-g} = \frac{0.59(1+g)}{0.1115-g}$$
$$0.9388 - 8.42g = 0.59 + 0.59g$$
$$9.01g = 0.3488$$
$$g = 0.0387 = 3.87\%$$

6. If Alex Renteria is correct that the current price of Tasty Foods stock is its fair value, what is the expected capital gains yield on the stock?
   A. 3.87%
   B. 4.25%
   C. 5.30%

The following information relates to Questions 7 – 12.

Assorted Funds, a U.K.-based globally diversified equity mutual fund, is considering adding Talisman Energy Inc. (Toronto Stock Exchange: TLM) to its portfolio. Talisman is an independent upstream oil and gas company headquartered in Calgary, Canada. It is one of the largest oil and gas companies in Canada and has operations in several countries. Brian Dobson, an analyst at the mutual funds, has been assigned the task of estimating a fair value of Talisman. Dobson is aware of several approaches that could be used for this purpose. After carefully considering the characteristics of the company and its competitors, he believes the company will have extraordinary growth for the next few years and normal growth thereafter. So, he has concluded that a two-stage DDM is the most appropriate for valuing the stock.

Talisman pays semi-annual dividends. The total dividends during 2006, 2007 and 2008 have been C$0.114, C$0.15 and C$0.175, respectively. These imply a growth rate of 32% in 2007 and 17% in 2008. Dobson believes that the growth rate will be 14% in the next year. He has estimated that the first stage will include the next eight years.

Dobson is using the CAPM to estimate the required return on equity for Talisman. He has estimated that the beta of Talisman, as measured against the S&P/TSX Composite Index (formerly TSE 300 Composite Index), is 0.84. The Canadian risk-free rate, as measured for the Canadian government bond, is 5.5%. Based on these data, Dobson has estimated that the required return on Talisman stock is 0.41 + 0.84(0.055) = 0.0872 or 8.72%. Dobson is doing the analysis in January 2009 and the stock price at that time is C$17.

Dobson realises that even within the two-stage DDM, there could be some variations in the approach. He would like to explore how these variations affect the valuation of the stock. Specifically, he wants to estimate the value of the stock for each of the following approaches separately.

I. The dividend growth rate will be 14% throughout the first stage of 8 years. The dividend growth rate thereafter will be 7%.

II. Instead of using the estimated stable growth rate of 7% in the second stage, Dobson wants to use his estimate that 8 years later Talisman's stock will be worth 17 times its earnings per share (trailing P/E of 17). He expects that the earnings retention ratio at that time will be 0.70.

III. In contrast to the first approach above in which the growth rate declines abruptly from 14% in the 8th year to 7% in the 9th, the growth rate would decline linearly form 14% in the first year to 7% in the 9th.

7. What is the terminal value of the stock based on the first approach?
   A. C$17.65
   B. C$31.06
   C. C$33.09

Time	Value	Calculation	D_t or V_t	Present values $D_t/1.0872^t$ or $Vt/1.0872^t$
1	D_1	C$0.175(1.14)	C$0.1995	C$0.1835
2	D_2	$0.175(1.14)^2$	0.2274	0.1924
3	D_3	$0.175(1.14)^3$	0.2593	0.2018
4	D_4	$0.175(1.14)^4$	0.2956	0.2116
5	D_5	$0.175(1.14)^5$	0.3369	0.2218
6	D_6	$0.175(1.14)^6$	0.3841	0.2326
7	D_7	$0.175(1.14)^7$	0.4379	0.2439
8	D_8	$0.175(1.14)^8$	0.4992	0.2557
8	V_8	$0.175(1.14)^8(1.07)/0.0872 - 0.07)$	31.0550	15.9095
				C$17.6528

8. In the first approach, what proportion of the total value of the stock is represented by the value of the second stage?
   A. 0.10
   B. 0.52
   C. 0.90

$$\frac{15.9095}{17.6528} = 0.90$$

9. What is the terminal value of the stock based on the second approach?
   A. C$12.12
   B. C$28.29
   C. C$33.09

$V_8 / E_8 = 17$

$D_8 / E_8 = 1 - 0.70 = 0.30$

$D_8 = C\$0.4992$ (See solution to Q 7)

$\therefore E_8 = D_8 / 0.3 = 0.4992 / 0.3 = 1.6640$

$\therefore V_8 = 17 \times E_8 = 17 \times 1.6440 = C\$28.2880$

10. What is the current value of the stock based on the second approach?
    A. C$16.24
    B. C$17.65
    C. C$28.29

$PV \text{ of } V_8 = \dfrac{28.2880}{1.0872^8} = 14.4919$

Sum of PV of D_1 to $D_8 = 1.7433$ (see solution to Q 7)

$\therefore V_0 = 14.4919 + 1.7433 = C\$16.2352$

11. Based on the third approach (the H model), the stock is:
    A. undervalued.
    B. fairly valued.
    C. overvalued.

$$V_0 = \frac{D_0(1+g_L) + D_0 H(g_S - g_L)}{r - g_L}$$
$$= \frac{0.175(1.07) + 0.175(4)(0.14 - 0.07)}{0.0872 - 0.07}$$
$$= 13.7855$$

Since the market price is C$17, the stock is overvalued.

12. Dobson is wondering what the consequences would be if the duration of the first stage was assumed to be 11 years instead of 8, with all the other assumptions/estimates remaining the same. Considering this change, which of the following is true?
    A. In the second approach, the proportion of the total value of the stock represented by the second stage would not change.
    B. The total value estimated using the third approach would increase.
    C. Using this new assumption and the first approach will lead Dobson to conclude that the stock is overvalued.

The following information relates to Questions 13 – 18.

Ryan Leigh is preparing a presentation that analyses the valuation of the common stock of two companies under consideration as additions to his firm's recommended list, Emerald Corporation and Hold Corporation. Leigh has prepared preliminary valuations of both companies using a FCFE model and is preparing a value estimate for Emerald using a dividend discount model. Holt's 2007 and 2008 financial statements are shown below.

Holt Corporation Consolidated Balance Sheets (US$ Millions)

		As of 31 December		
		2008		2007
Assets				
Current assets				
Cash and cash equivalents		372		315
Accounts receivable		770		711
Inventories		846		780
Total current assets		1,988		1,806
Gross fixed assets	4,275		3,752	
Less: Accumulated depreciation	1,176	3,099	906	2,846
Total assets		$5,087		$4,652
Liabilities and shareholders's equity				
Current liabilities				
Accounts payable		476		443
Accrued taxes and expenses		149		114
Notes payable		465		450
Total current liabilities		1,090		1,007
Long-term debt		1,575		1,515
Common stock		525		525
Retained earnings		1,897		1,605
Total liabilities and shareholders' equity		$5,087		$4,652

Holt Corporation Consolidated Income Statement for the Year Ended 31 Dec 2008 (US$ Millions)

Total revenues	$3,323
Cost of goods sold	1,287
Selling, general and administrative expenses	858
Earnings before interest, taxes, depreciation and amortisation (EBITDA)	1,178
Depreciation expense	270
Operating income	908
Interest expense	195
Pre-tax income	713
Income tax (at 32%)	228
Net income	$485

Leigh presents his valuations of the common stock of Emerald and Holt to his supervisor, Alice Smith. Smith has the following questions and comments.

1. "I estimate that Emerald's long-term expected dividend payout rate is 20% and its return on equity is 10% over the long term."
2. "Why did you use a FCFE model to value Holt's common stock? Can you use a DDM instead?"
3. "How did Holt's FCFE for 2008 compare with its FCFF for the same year? I recommend you use a FCFF model to value Holt's common stock instead of using a FCFE model because Holt has had a history of leverage changes in the past."
4. "In the last three years, about 5% of Holt's growth in FCFE has come from decreases in inventory."

Leigh responds to each of Smith's points as follows:

1. "I will use your estimates and calculate Emerald's long-term, sustainable dividend growth rate."
2. "There are two reasons why I used the FCFE model to value Holt's common stock instead of using a DDM. The first reason is that Holt's dividends have differed significantly form its capacity to pay dividends. The second reason is that Holt is a takeover target and once the company is taken over, the new owners will have discretion over the uses of free cash flow."
3. "I will calculate Holt's FCFF for 2008 and estimate the value of Holt's common stock using a FCFF model."
4. "Holt is a growing company. In forecasting either Holt's FCFE or FCFF growth rates, I will not consider decreases in inventory to be a long-term source of growth."

13. Which of the following long-term FCFE growth rates is *most* consistent with the facts and stated policies of Emerald?
    A. 5% or lower
    B. 2% or higher
    C. 8% or higher

$$g = b \times ROE = (1 - 0.2) \times (0.10) = 0.08 = 8\%$$

14. Do the reasons provided by Leigh support his use of the FCFE model to value Holt's common stock instead of using a DDM?
    A. Yes
    B. No, because Holt's dividend situation argues in favour of using the DDM.
    C. No, because FCFE is not appropriate for investors taking a control perspective.

    The company pays dividends but its dividends differ significantly from the company's capacity to pay dividends (the first reason given by Leigh).

    The investor takes a control perspective (the second reason given by Leigh).

15. Holt's FCFF (in millions) for 2008 is *closest* to:
    A. $308
    B. $370
    C. $422

$$WCInv = (770 - 711) + (846 - 780) - (476 - 443) - (149 - 114) = 57$$
$$FCInv = 4275 - 3752 = 523$$
$$FCFF = NI + NCC + IntExp(1 - Tax\ rate) - FCInv - WCInv$$
$$= 485 + 270 + 195(1 - 0.32) - 523 - 57$$
$$= \$307.6 \text{ million}$$

16. Holt's FCFE (in millions) for 2008 is *closest* to:
    A. $175
    B. $250
    C. $364

$$\begin{aligned} Net\ borrowing &= (465 - 450) + (1575 - 1515) = 75 \\ FCFE &= NI + NCC - FCInv - WCInv + Net\ borrowing \\ &= 485 + 270 - 523 - 57 + 75 \\ &= \$250 \text{ million} \end{aligned}$$

17. Leigh's comment about not considering decreases in inventory to be a source of long-term growth in free cash flow for Holt is:
    A. inconsistent with a forecasting perspective.
    B. mistaken because decreases in inventory are a use rather than a source of cash.
    C. consistent with a forecasting perspective because inventory reduction has a limit, particularly for a growing firm.

18. Smith's recommendation to use a FCFF model to value Holt is:
    A. logical, given the prospect of Holt changing capital structure.
    B. not logical because a FCFF model is used only to value the total firm.
    C. not logical because FCFE represents a more direct approach to free cash flow valuation.

SAMPLE SECTION B (Short Answer) QUESTIONS

The following information relates to Questions 19 – 23.

John Jones, CFA, is head of the research department of Peninsular Research. One of the companies he is researching, Mackinac Inc., is a US-based manufacturing company. Machinac has released its June 2001 financial statements, shown in Tables A, B and C (overleaf). Mackinac has announced that it has finalised an agreement to handle North American production of a successful product currently marketed by a foreign company. Jones decides to value Mackinac using the dividend discount model (DDM) and the free cash flow to equity (FCFE) model. After reviewing Mackinac's financial statements and forecasts related to the new production agreement Jones concludes the following:

- Macinac's earnings and FCFE are expected to grow 17% a year over the next three years before stabilising at an annual growth rate of 9%.
- Mackinac will maintain the current payout ratio.
- Mackinac's beta is 1.25.
- The government bond yield is 6%, and the market equity risk premium is 5%.

19. Calculate the value of a share of Mackinac's common stock using the two-stage DDM. Show your calculations.

$$DPS_0 = \frac{\text{Cash dividends}}{\text{Shares outstanding}} = \frac{22,470}{13,000} = \$1.7285$$

$$DPS_1 = DPS_0 \times (1+g_1) = 1.7285 \times 1.17 = \$2.0223$$

$$DPS_2 = DPS_0 \times (1+g_1)^2 = 1.7285 \times 1.17^2 = \$2.3661$$

$$DPS_3 = DPS_0 \times (1+g_1)^3 = 1.7285 \times 1.17^3 = \$2.7683$$

$$DPS_4 = DPS_0 \times (1+g_1)^3 \times (1+g_2) = 1.7285 \times 1.17^3 \times 1.09 = \$3.0175$$

$$\begin{aligned} r &= R_F + \beta_1 \left[E(R_M) - R_F \right] \\ &= 0.06 + 1.25(0.05) \\ &= 0.1225 = 12.25\% \end{aligned}$$

$$\begin{aligned} V_0 &= \frac{D_1}{1+r} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_4}{r-g_2} \times \frac{1}{(1+r)^3} \\ &= \frac{2.0223}{1.1225} + \frac{2.3661}{1.1225^2} + \frac{2.7683}{1.1225^3} + \frac{3.0175}{0.1225-0.09} \times \frac{1}{1.1225^3} \\ &= \$71.28 \end{aligned}$$

20. Calculate the value of a share of Mackinac's common stock using the two-stage FCFE model. Show your calculations

Net income = \$37,450
Depreciation = \$10,500
Capital expenditure = \$15,000
Change in debt outstanding = \$4,000

$$\begin{aligned} FCFE_0 &= \text{Net income} + \text{Depreciation} - \text{Capital expenditure} \\ &\quad - \text{Increase in working capital} + \text{Decrease in debt outstanding} \\ &= 37,450 + 10,500 - 15,000 - 5,500 + 4,000 \\ &= \$31,450 \end{aligned}$$

$$FCFE_0 \text{ per share} = \frac{31,450}{13,000} = \$2.4192$$

$$FCFE_1 = FCFE_0 \times (1+g_1) = 2.4192 \times 1.17 = \$2.8305$$

$$FCFE_2 = FCFE_0 \times (1+g_1)^2 = 2.4192 \times 1.17^2 = \$3.3117$$

$$FCFE_3 = FCFE_0 \times (1+g_1)^3 = 2.4192 \times 1.17^3 = \$3.8747$$

$$FCFE_4 = FCFE_0 \times (1+g_1)^3 \times (1+g_2) = 2.4192 \times 1.17^3 \times 1.09 = \$4.2234$$

$$\begin{aligned} V_0 &= \frac{FCFE_1}{1+r} + \frac{FCFE_2}{(1+r)^2} + \frac{FCFE_3}{(1+r)^3} + \frac{FCFE_4}{r-g_2} \times \frac{1}{(1+r)^3} \\ &= \frac{2.8305}{1.1225} + \frac{3.3117}{1.1225^2} + \frac{3.8747}{1.1225^3} + \frac{4.2234}{0.1225-0.09} \times \frac{1}{1.1225^3} \\ &= \$99.77 \end{aligned}$$

21. Mackinac is currently trading at $80.00. Assuming you are confident in your forecast dividend growth for the next three years and that you estimate the dividend in the fourth year to be $3.0175. Assuming you are also confident in your estimation of the stock's required rate of return. Calculate the sustainable growth rate implied by the market for Mackinac three years out.

From Question 19:

$$r = 12.25\%$$

$$DPS_1 = \$2.0223 \therefore PV(DPS_1) = \frac{2.0223}{0.1225} = \$1.8016$$

$$DPS_2 = \$2.3661 \therefore PV(DPS_2) = \frac{2.3661}{0.1225^2} = \$1.8778$$

$$DPS_3 = \$2.7683 \therefore PV(DPS_3) = \frac{2.7683}{0.1225^3} = \$1.9573$$

$$DPS_4 = \$3.0175$$

If the current price is $80, the implied present value of the terminal value must be:

$$PV(\text{Terminal Value}) = 80.00 - 1.8016 - 1.8778 - 1.9573 = \$74.3633$$

$$\text{Terminal Value} = 74.3663 \times 1.1225^3 = \$105.1763$$

$$\text{Terminal Value} = \frac{D_4}{r-g}$$

$$\begin{aligned} \therefore g &= r - \frac{D_4}{\text{Terminal Value}} \\ &= 0.1225 - \frac{3.0175}{105.1763} \\ &= 0.0938 = 9.38\% \end{aligned}$$

22. Compare the implied sustainable growth rate for dividends calculated in Question 21 with your estimate for sustainable growth for Mackinac based on its financial statements for the year ended June 30, 2001. Show your calculations.

$$ROE = \frac{\text{Net income}}{\text{Shareholders' equity}} = \frac{37,450}{150,000} = 25\%$$

$$\begin{aligned}\text{Addition to retained earnings} &= Netincome - Dividends \\ &= 37,450 - 22,470 \\ &= \$14,980\end{aligned}$$

$$\text{Retention ratio} = \frac{14,980}{37,450} = 40\%$$

$$\text{Sustainable growth rate} = b \times ROE = 0.40 \times 0.25 = 0.10 = 10\%$$

The current market price of $80 implies a long-term sustainable growth rate of 9.38%, slightly lower than the sustainable growth rate based on the financial statements.

The intrinsic value of the company based on a sustainable growth rate of 10% and the GGM is estimated to be $85, which is higher than the current market price. This confirms that the 9.38% sustainable growth rate implied by the current price is not lower than rate implied by the 2001 financial statements solely due to the higher forecasts for the next three years, but also implies that the market has not fully factored in the higher sustainable growth rate implied by its 2001 performance continuing indefinitely into the future.

23. Jones is discussing with a corporate client the possibility of that client acquiring a 70 % interest in Mackinac. Discuss whether the DDM or FCFE model is more appropriate for this client's valuation purposes.

The FCFE model is best for valuing companies for takeovers or in situations that have a reasonable chance of a change in corporate control. Because controlling stockholders can change the dividend policy, they are interested in estimating the maximum residual cash flow after meeting all financial obligations and investment needs. The DDM is base on the premise that the only cash flows received by stockholders are dividends. FCFE uses a more expansive definition to measure what a company can afford to pay out as dividends.

Table A: Mackinac Inc. Annual Income Statement
30 June 2001
(thousands of dollars, except for per-share data)

Sales	$250,000
Cost of goods sold	125,000
Gross operating profit	125,000
Selling, general and administrative expenses	50,000
EBITDA	75,000
Depreciation and amortization	10,500
EBIT	64,500
Interest expense	11,000
Pre-tax income	53,500
Income tax	16,050
Net income	$37,450
Shares outstanding	13,000
EPS	$2.88

Table B: Mackinac Inc. Balance Sheet
30 June 2001
(thousands of dollars)

Current Assets			
Cash and equivalents		$20,000	
Receivables		40,000	
Inventories		29,000	
Other current assets		23,000	
Total current assets			112,000
Non-current Assets			
Property, plant and equipment	$145,000		
Less: Accumulated depreciation	(43,000)		
Net property, plant and equipment		102,000	
Investments		70,000	
Other non-current assets		36,000	
Total non-current assets			208,000
Total assets			$320,000
Current Liabilities			
Accounts payable		$41,000	
Short-term debt		12,000	
Other current liabilities		17,000	
Total current liabilities			70,000
Non-current Liabilities			
Long-term debt		100,000	
Total non-current liabilities			100,000
Total liabilities			170,000
Shareholders' Equity			
Common equity		40,000	
Retained earnings		110,000	
Total equity			150,000
Total liabilities and equity			$320,000

Table C: Mackinac Inc. Cash Flow Statement
30 June 2001
(thousands of dollars)

Cash Flow from Operating Activities		
Net income		$37,450
Depreciation and amortization		10,500
Change in Working Capital		
(Increase) Decrease in receivables	($5,000)	
(Increase) Decrease in inventories	(8,000)	
Increase (Decrease) in payables	6,000	
Increase (Decrease) in other current liabilities	1,500	
Net change in working capital		(5,500)
Net cash from operating activities		$42,450
Cash Flow from Investing Activities		
Purchase of property, plant and equipment	($15,000)	
Net cash from investing activities		($15,000)
Cash Flow from Financing Activities		
Change in debt outstanding	$4,000	
Payment of cash dividends	(22,470)	
Net cash from financing activities		(18,470)
Net change in cash and cash equivalents		$8,980
Cash at beginning of period		11,020
Cash at end of period		$20,000