Quiz 2 – 2017/2018 Term II Prepared by Dr. Richard M. Crowley, 2018
Sections G5, G6, G7, & G8

Name: _____ Section: G___ Score: ____ / 100

This quiz is worth 7.5% of the overall course grade. You have 60 minutes from the start of class to complete the quiz. The quiz will be graded out of a total of 100 points, and there are 3 extra credit marks available. **Read each question carefully** and do your best to answer it. Make sure to show your work when answering questions, as partial credit will be awarded for work that, while not leading to the correct answer, shows significant progress towards it.

This quiz is a closed-book quiz. You may only use calculators, along with other devices as explicitly allowed by university policy.

This quiz asks you to solve 4 questions, each based on a described situation. Write your final answers in the space provided. You may use the other whitespace provided for showing your work. You may also use the last page of the exam as additional scratch paper, if needed. If rounding is not mentioned in a question, you may round to the nearest integer.

When you are finished, you may turn the quiz in at the front. If you wish to use any electronic devices after finishing, please do so outside the classroom.

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Question 1, Inventory **(26 points)**, 3 parts

Score: _____/26

You are working for a small startup with the goal of sending a drone to the moon. As they have little financing, they decide to start out by selling t-shirts inspired by your company's vision. You started buying only a small quantity and selling at a relatively low price. After a good bit of publicity, the t-shirts became a viral sensation, allowing you to purchase larger amounts and sell at higher prices. A complete record of purchases and sales for the month are listed below.

Date	Details
Starting balance	50 shirts at $8 each
Feb 2, 2018	Sold 10 at $15 each
Feb 9, 2018	Sold 20 at $15 each
Feb 12, 2018	Purchased 100 shirts at $5 each
Feb 16, 2018	Sold 80 at $20 each
Feb 19, 2018	Purchase 160 shirts at $4 each
Feb 23, 2018	Sold 80 at $15 each

Part 1) What is the company's revenue for the month? **(2 points)**

10x$15 + 20x$15 + 80x$20 + 80x$15 = $3,250

REVENUE
3,250

Part 2) The company is debating whether to use *Perpetual FIFO* or *Perpetual Average Cost*. Calculate COGS and Gross profit under both methods. Extra space for work is provided on the next page. *[Do not round prices while calculating average cost]* **(20 points)**

	Perpetual FIFO			Perpetual average cost		
Date	Units	Inventory acquired	Ending balance	Units	Inventory acquired	Ending balance
Start	50@8	400		50@8	400	
Feb 2, 2018	40@8			40@8		
Feb 9, 2018	20@8			20@8		
Feb 12, 2018	20@8 + 100@5	500		120@5.5	500	
Feb 16, 2018	40@5			40@5.5		
Feb 19, 2018	40@5 + 160@4	640		200@4.3	640	
Feb 23, 2018	120@4		480	120@4.3		516

FIFO COGS = Starting inventory + Purchases – Ending inventory = 400 + (500 + 650) – 480 = 1,060

Average cost prices: $\frac{20\times8+100\times5}{20+100} = 5.5$; $\frac{40\times5.5+160\times4}{40+160} = 4.3$

Avg Cost COGS = Starting inventory + Purchases – Ending inventory = 400 + (500 + 650) – 516 = 1,024

Gross profit = Revenue – COGS. FIFO gross profit = 3,250 - 1,060 = 2,090;
Avg Cost gross profit = 3,250 – 1,024 = 2,226

	FIFO	AVERAGE COST
COGS	1,060	1,024
GROSS PROFIT	2,190	2,226

Part 3) The company's executives are debating which method to use. Some executives want to maximize net income to make the company's financials look more attractive to venture capital investors, while others want to save money by minimizing tax payments. Which method should each group push for? **(4 points)**

	MAXIMIZE NET INCOME	**MINIMIZE TAX PAYMENTS**
METHOD	Perpetual Average Cost	Perpetual FIFO

To maximize net income, we would pick the inventory method with the *highest* gross profit in this case. To minimize tax payments, we would pick the inventory method with the *lowest* gross profit.

Extra space for work on Part 2:

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Question 2, P&E **(32 points)**, 5 parts

Score: _____/32

On April 1, 2017, Coffee Corp acquired an industrial grade coffee roasting machine from Germany.

Part 1) To acquire the machine, they paid $50,000. The machine was shipped FOB destination at a cost of $1,000. To import the machine they paid a $500 stamp duty. They paid a technician $300 to inspect the machine before use. They also tested the machine; the test cost $100 to run and produced $100 of useful inventory. After the successful test, Coffee Corp held a celebratory coffee tasting, costing $200 in inventory and a few broken mugs due to over-caffeination. After 1 month of usage, they had routine maintenance on the machine. Which of these costs should they include in the value of the machine? Select *No* if the net effect of a cost on the machine's value is 0. **(8 points)**

Cost	Include? Yes or No	Cost	Include? Yes or No
Purchase price	Yes (always include)	Testing costs	No (100 – 100 = 0)*
Shipping	No (*FOB destination*)	Celebratory party	No (not needed)
Tax (stamp duty)	Yes (non-refundable)	Broken mugs	No (related to party)
Inspection	Yes (needed to start)	Routine maintenance	No (after usage)

*We include testing costs net of the proceeds of useful inventory from testing. Here, the useful inventory equals the cost of testing, hence there is no need to add anything to the machine's cost.

Use the following information for Parts 2 through 4. Suppose that after substantial maintenance work on January 1, 2018, the machine is now able to work twice as fast. Due to this substantive difference in function, Coffee Corp decides to revalue the asset. It determines that the machine has $64,000 of value, a useful life of 8 years and a salvage value of 28,000. Coffee Corp's fiscal year end is December 31st.

Part 2) If they use double declining balance depreciation, what are the amounts of depreciation they will record on December 31st, 2018, 2019, and 2020? **(6 points)**

$$DDB\ Depreciation = NAV \times \frac{2}{years}$$

Year 1: $64{,}000 \times \frac{2}{8} = 16{,}000$; NAV = 64,000 – 16,000 = 48,000

Year 2: $48{,}000 \times \frac{2}{8} = 12{,}000$; NAV = 48,000 – 12,000 = 36,000

Year 3: $36{,}000 \times \frac{2}{8} = 9{,}000$; NAV = 36,000 – 9,000 = 27,000 < SALVAGE VALUE of 28,000

Thus, we need to depreciate down to salvage value instead: 36,000 – 28,000 = 8,000.

31 DEC 2018	31 DEC 2019	31 DEC 2020
16,000	**12,000**	**8,000**

Part 3) If they use straight line depreciation, what are the amounts of depreciation they will record on December 31st, 2018, 2019, and 2020? **(6 points)**

$$SL\ Depreciation = \frac{Cost - Salvage}{years}$$

Year 1 = Year 2 = Year 3 = $\frac{64{,}000-28{,}000}{8} = 4{,}500$

31 DEC 2018	31 DEC 2019	31 DEC 2020
4,500	**4,500**	**4,500**

Part 4) If they use units of production depreciation, and they use 10%, 20%, and 10% of the asset's lifetime production capacity in the years 2018, 2019, and 2020, respectively, what are the amounts of depreciation they will record for each of these three years? **(6 points)**

$$Unit\ Depreciation = (Cost - Salvage) \times \%\ Used$$

Year 1 = Year 3 = $(64{,}000 - 28{,}000) \times 10\% = 3{,}600$

Year 2 = $(64{,}000 - 28{,}000) \times 20\% = 7{,}200$

2018	2019	2020
3,600	7,200	3,600

Part 5) Suppose that on Coffee Corp's financial statements as of December 31, 2022, the roaster is listed on Coffee Corp's books with a cost of $64,000 and accumulated depreciation of $22,500. On March 31st, 2023, Coffee Corp decides to exchange the coffee roaster for warehouse space worth $41,500. If they kept the roaster for the full year, they would record $4,500 of straight line depreciation on it on December 31, 2023. What is the journal entry they would record for this exchange? **(6 points)**

Partial depreciation amount = $4{,}500 \times \frac{3}{12} = 1{,}125$

DATE	ACCOUNTS	DR	CR
2023.03.31	Depreciation expense	1,125	
	Warehouse	41,500	
	Acc. Depr. -- Machine	22,500	
	Gain on asset sale		1,125
	Machine		64,000

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Question 3, Liabilities **(28 points)**, 5 parts

Score: _____/28

In March 2018, there were rumors that Qualcomm, a US semiconductor company, would be acquired by Singaporean company Broadcom Limited. Details emerged that Broadcom would offer $117B USD for the acquisition. However, as of Q4 2017, Broadcom only had $11B of cash on hand. Consider what would happen if Broadcom was to issue a bond to help with this acquisition.

Suppose that Broadcom issued a $20,000M bond with a 3% coupon rate to help raise cash for the acquisition. The bond has 20 years of life with semiannual coupon payments and a 30/360 day basis.

Part 1) If Broadcom issues this bond at par on March 31, 2018, how much interest expense will they record each coupon period? *[Record values to the nearest million.]* **(4 points)**

$$P = 20{,}000M; CF = 20{,}000M \times \frac{3\%}{2} = 300M; T = 20 \times 2 = 40$$

Since the bond is at par, our interest expense and our coupon payment are the same each period; our coupon payment each period is CF

INTEREST EXPENSE
300M

Part 2) Broadcom's fiscal year end in 2018 is October 28th. How many days of accrued interest will Broadcom need to account for in their adjusting entry on October 28, 2018? **(4 points)**

March 31 -> September 30th is 6 months, thus we would pay the first coupon then. We only need to accrue from this coupon payment to October 28th.

September 30 -> October 28 = 28 days.

DAYS TO ACCRUE INTEREST
28 DAYS

Part 3) Given the political uncertainty surrounding the acquisition, suppose that Broadcom instead is forced to offer the bond at a 4% yield. What would be the price of the bond in this case? *[Record values to the nearest million.]* **(8 points)**

$$P = 20{,}000M; CF = 20{,}000M \times \frac{3\%}{2} = 300M; T = 20 \times 2 = 40; r = \frac{4\%}{2} = 2\%$$

$$Price = \frac{CF}{r}\left[1 - \frac{1}{(1+r)^T}\right] + \frac{P}{(1+r)^{40}} = \frac{300M}{2\%}\left[1 - \frac{1}{(1+2\%)^{40}}\right] + \frac{20{,}000M}{(1+2\%)^{40}} = 17{,}264M$$

PRICE AT 4% YIELD
17,264M

Part 4) At the same the acquisition was being discussed, there were rumors that Intel, a competitor of Qualcomm and Broadcom, might attempt to acquire both companies. If investors are bullish on this proposition, it is possible that Broadcom could instead issue the bond at a premium. If Broadcom was able to issue the bond at a price of $24,000M, corresponding to a yield of 1.80%, how much interest expense would they record for the first coupon payment? For the second coupon payment? Ignore any adjusting entries. *[Record values to the nearest million.]* **(8 points)**

$Carry_1 = 24{,}000M$ (the price)

$IE_1 = Carry_1 \times r = 24{,}000M \times \frac{1.80\%}{2} \approx 216M.$ Coupon payment is CF, 300M.

Change in premium is 300M – 216M = 84M.

$Carry_2 = Carry_1 - \Delta Premium = 24{,}000M - 84M = 23{,}916M.$

$IE_2 = Carry_2 \times r = 23{,}916M \times \frac{1.80\%}{2} \approx 215M.$

INTEREST EXPENSE – COUPON 1	INTEREST EXPENSE – COUPON 2
216M	**215M**

Part 5) If Broadcom issued the bond as a premium bond as in Part 4, what is the total amount of interest expense they would save over the 20 years, as compared to if they issued the bond at par? *[Record values to the nearest million.]* **(4 points)**

This is the intuition behind the bond premium.

Bond premium = Price – Par = 24,000M – 20,000M = 4,000M

TOTAL INTEREST EXPENSE SAVED
4,000M

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Question 4, Intangibles **(14 points)**, 3 parts

Score: _____/14

In July 2017, Nesta Investment Holdings Limited (NIHL) agreed to purchase Global Logistic Properties (GPL) for $16B SGD. NIHL is a subsidiary of a Chinese investment firm specifically created to purchase GLP, a Singaporean company. This deal was the largest M&A transaction of quarter 4 2017 in Singapore.

For the acquisition, NIHL paid an additional 25% above the fair value of the company, i.e., GLP itself had a fair value (net assets) of $12.8B. Furthermore, at the time of the acquisition, GLP had $41B worth of warehousing assets.

Part 1) What is the amount of goodwill, in billions of Singapore dollars, NIHL will acquire in this transaction? **(4 points)** *[Round to 1 decimal place]*

Goodwill = Price – Net assets = 16B – 12.8B = 3.2B

GOODWILL
3.2B

Part 2) What amount of liabilities, in billions of Singapore dollars, did GLP have on their books at the time of acquisition? Assume that the only assets GLP has are its warehousing assets, and that the book value and market value of these warehousing assets are the same. **(4 points)** *[Round to 1 decimal place]*

Net assets = Assets – Liabilities

12.8B = 41B - Liabilities

Liabilities = 41B – 12.8B = 28.2B

LIABILITIES
28.2B

Part 3) If, in 1 year, NIHL determines that the value of goodwill has dropped by $1B, what is the journal entry to record this? **(6 points)**

Since goodwill is an infinitely lived intangible asset, decreases in this account are impairments.

NUMBER	ACCOUNTS	DR	CR
1	Impairment expense	1B	
	Goodwill		1B

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Question EXTRA CREDIT (**3 extra points**)

Score: _____/3

Note: This question is intended to be difficult, and to explore an idiosyncrasy in a topic we covered in class. You should not attempt this question unless you have finished the other questions on the exam already, as your time is better spent on the main questions on this quiz. This question likely requires much more effort than the points allocated to it (thus why it is extra credit).

Recall that when we discussed double declining balance, it is possible for the final year of depreciation to have more depreciation than the prior years, particularly for low salvage values. This spike upward in depreciation expense was due to recording the final year's depreciation down to salvage value, taking depreciation expense to be $\text{NAV} - \text{Salvage value}$.

What is the minimum asset life needed, in years, such that this final depreciation amount is the same as the prior year's depreciation? What is the minimum asset life needed, in years, such that this final depreciation amount is equal to double the prior year's depreciation? Triple?

[Hint: The answers are all whole numbers.]

Note: This question is for to explore an interesting feature of double declining balance depreciation and will not be on the final in any form -- thus why it was extra credit, not part of the exam proper.

There are two keys to solving this question efficiently:

1) The final payment is maximized by having a lower salvage value. Thus, set salvage = 0.
2) It is much easier to work with net asset values (NAVs) than depreciation amounts.

With 0 salvage value, cost *C*, and life *L*, the NAV value is…

1 period: $NAV_1 = C - C \times \frac{2}{L} = C(1 - \frac{2}{L})$

2 periods: $NAV_2 = C\left(1 - \frac{2}{L}\right) - C\left(1 - \frac{2}{L}\right) \times \frac{2}{L} = C\left(\left(1 - \frac{2}{L}\right) - \left(1 - \frac{2}{L}\right) \times \frac{2}{L}\right) = C\left(1 - \frac{2}{L}\right)^2$

3 periods: $NAV_3 = C\left(1 - \frac{2}{L}\right)^2 - C\left(1 - \frac{2}{L}\right)^2 \times \frac{2}{L} = C\left(\left(1 - \frac{2}{L}\right)^2 - \left(1 - \frac{2}{L}\right)^2 \times \frac{2}{L}\right) = C\left(1 - \frac{2}{L}\right)^3$

…

n periods: $NAV_n = C\left(1 - \frac{2}{L}\right)^n$

Furthermore, note that we can express depreciation as the difference in NAVs, since that is precisely how we usually calculate NAV anyway.

$$Depreciation_{n-1} = NAV_{n-1} - NAV_n$$

Combining the above two, we can get the ratio of the final payment, i.e., the NAV after *n* periods, and the depreciation before it:

$$\frac{NAV_n}{NAV_{n-1} - NAV_n} = \frac{C\left(1 - \frac{2}{L}\right)^n}{C\left(1 - \frac{2}{L}\right)^{n-1} - C\left(1 - \frac{2}{L}\right)^n} = \frac{1 - \frac{2}{L}}{1 - (1 - \frac{2}{L})} = \frac{1 - \frac{2}{L}}{\frac{2}{L}} = \boldsymbol{\frac{L}{2} - 1}$$

Then, solve for L when the equation equals 1, 2, and 3.

SAME	DOUBLE	TRIPLE
4	6	8