Chapter 4

複利和年金

問答題

1. 單利的計算基礎僅爲每期的原始本金金額；複利計算的基礎則爲期初的本金金額加上先前各期累積的利息，若期間在兩期以上，則本金所產生的利息會加入本金繼續再衍生新的利息，亦即利上加利。

因此，在利率條件相同的情況下，複利計算的結果，金額會較單利計算結果爲大。

2. 終值爲某筆或多筆投資金額，經由複利計算後，在未來特定日所累積變成的金額。現值則是未來某筆或多筆金額，經由複利計算後，在今日折現後的金額。

3. 相等間隔時間連續支付 (或收取) 相等金額，且每期計息之利率也相同，即所謂的年金 (annuity)。由於各期金額的收付可於期初或期末爲之，因此年金又區分爲二類，於期末收付者，稱爲普通年金 (ordinary annuity)；於期初收付者，稱爲到期年金 (annuity due)。

4. 所謂遞延年金 (deferred annuities)，係指於若干期後才發生收付的年金。例如遞延 3 年之五年普通年金，意謂前三年並無金額收付的發生，而第一期的收付是發生於第四年底，且連續 5 年。

5. 債券的面額、票面利率、債券的發行的日期、付息日期、到期日與發行時之市場利率。

選擇題

1. (C) **2.** (D) **3.** (D)

4. (D) **5.** (B) **6.** (B)

7. (C) **8.** (B) **9.** (C)

10. (B) **11.** (A) **12.** (C)

13. (B) **14.** (C) **15.** (A)

16. (D) **17.** (C) **18.** (C)

19. (C)

練習題

1. (1) $100,000 + $100,000 × 4% × 6 = $124,000

(2) $100,000 × $(1 + 0.04)^6$ = $100,000 × 1.26532 = $126,532

2. (1) $60,000 × (Future Value of 1, 4 periods, 12%)
= $60,000 × 1.57352 = $94,411

(2) $60,000 × (Future Value of 1, 8 periods, 6%)
= $60,000 × 1.59385 = $95,631

(3) $60,000 × (Future Value of 1, 16 periods, 3%)
= $60,000 × 1.60471 = $96,283

3. $1,300,000 × (Present Value of 1, 7 periods, 8%)
= $1,300,000 × 0.58349 = $758,537

4. (1) $130,000 × (Future Value of 1, 6 periods, 12%)
= $130,000 × 1.97382 = $256,597

(2) $45,000 × (Present Value of 1, 2 periods, 10%)
= $45,000 × 0.82645 = $37,190

(3) $30,000 × (Future Value of 1, 6 periods, 2%)
= $30,000 × 1.12616 = $33,785

(4) $250,000 × (Present Value of 1, 5 periods, 15%)
= $250,000 × 0.49718 = $124,295

5. $10,000 × (Future Value of an Ordinary Annuity, 6 periods, 5%)
= $10,000 × 6.80191 = $68,020

6. $14,000,000 ÷ (Future Value of an Ordinary Annuity, 11 periods, 8%)
= $14,000,000 ÷ 16.64549 = $841,069

7. $1,000,000 ÷ (Future Value of an Annuity Due, 6 periods, 4%)
= $1,000,000 ÷ 6.89829 = $144,963

8. $108,871 × (Future Value of an Annuity Due, N periods, 10%) = $840,000
(Future Value of an Annuity Due, N periods, 10%) = 7.71555
(Future Value of an Ordinary Annuity, N periods, 10%)×1.1=7.71555
故(Future Value of an Ordinary Annuity, N periods, 10%)=7.01414
When N=5→6.105100(不足)；When N=6→7.715610
故花花要存 6 年方可購買價值$840,000 **的東西，即** N = 6 **(年)**

9. $500,000 × 4% × (Present Value of an Ordinary Annuity, 8 periods, 3%) + $500,000 × (Present Value of 1, 8 periods, 3%)
= $20,000 × 7.01969 + $500,000 × 0.78941 = $535,099

10. $125,000 × (Present Value of an Ordinary Annuity, 5 periods, 12%)
$125,000 × 3.60478 = $450,597

11. 店面甲：$50,000,000

店面乙：

租金現值：$7,000,000 × (Present Value of an Annuity Due, 20 periods, 15%)
= $7,000,000 × 7.19823 = $50,387,610

店面丙：

租金現值 = $860,000 × (Present Value of an Ordinary Annuity, 20 periods, 15%)
= $860,000 × 6.25933 = $5,383,024
店面丙之淨現值 = $55,000,000 – $5,383,024 = $49,616,976

由於店面丙之現值最低，故哲普公司應選擇店面丙。

12. $56,000 × (Present Value of an Annuity Due, 36 periods, 2%)
= $56,000 × 25.99862 = $1,455,923

13. $7,000 × (Present Value of an Annuity Due, 6 periods, 2.5%)
= $7,000 × 5.64583 = $39,521
分期付款現值 $39,521 大於現購價 $39,000，故直接購買較划算。

14. $340,000 × (Present Value of an Annuity Due, 7 periods, 8%)
= $340,000 × 5.62288 = $1,911,779

$1,911,779 × (Present Value of an 1, 5 periods, 8%)
= $1,911,779 × 0.68058 = $1,301,119

$1,301,119 ÷ (Future Value of an Ordinary Annuity, 8 periods, 8%)
= $1,301,119 ÷ 10.63663 = $122,324

15. $70,000 × (Present Value of an Annuity Due, 10 periods, 4%) × (Present Value of 1, 2 periods, 8%)
= $70,000 × 8.43533 × 0.85734 = $506,236

現購價 = $150,000 + $506,236 = $656,236

應用問題

1.

年度	現金流量	折現因子	現值
×2	$579,481	0.89286	$ 517,395
×3	588,232	0.79719	468,933
×4	517,526	0.71178	368,365
×5	522,483	0.63552	332,048
×6	498,724	0.56743	282,991
×7	483,557	0.50663	244,984
資產之使用價值			$ 2,214,716

2. **方式一**

$450,000 ÷ $100,000 = 4.5

查表 Future Value of an Ordinary Annuity, 4%

4 periods = 4.24646 ； 5 periods = 5.41632

第五次付款達到目標—×3 年 6 月 30 日

方式二

$450,000 ÷ $49,500 = 9.09

查表 Future Value of an Ordinary Annuity, 2%

8 periods = 8.58297 ； 9 periods = 9.75463

第九次付款達到目標—×3 年 3 月 31 日

應選擇方式二，可於×3 年 3 月 31 日達到目標。

3. $500,000 × (Future Value of 1, 20 periods, 4%)

= $500,000 × 2.19112 = $1,095,560

$10,000,000 – $1,095,560 = $8,904,440

$8,904,440 ÷ (Future Value of an Ordinary Annuity, 10 periods, 4%)

= $8,904,440 ÷ 12.00611 = $741,659

4. **方法一**

$1,400,000 × (Future Value of 1, 5 periods, 15%)

= $1,400,000 × 2.01136 = $2,815,904

方法二

$100,000 × (Future Value of an Annuity Due, 20 periods, 3%)

= $100,000 × 27.67649 = $2,767,649

方法三

$400,000 × (Future Value of an Annuity Due, 5 periods, 12%)

= $400,000 × 7.11519 = $2,846,076

由於方法三之終值金額最高，書豪應選擇方法三。

5. $2,000,000 × 2% × (Present Value of an Ordinary Annuity, 12 periods, 3%) + $2,000,000 × (Present Value of 1, 12 periods, 3%)

= $40,000 × 9.95400 + $2,000,000 × 0.70138 = $1,800,920

6. **方法一**

$6,000 + $16,000 × (Present Value of an 1, 2 periods, 5%)

= $6,000 + $16,000 × 0.90703 = $20,512

方法二

$11,000 × (Present Value of an Ordinary Annuity, 2 periods, 5%)

= $11,000 × 1.85941 = $20,454

由於方法二之現值較低，八戒應選擇方法二。

7. **方案 A**

$300,000

方案 B

$40,000 × (Present Value of an Annuity Due, 10 periods, 8%)

$40,000 × 7.24689 = $289,876

由於方案 B 之現值較低，蘋果公司應選擇方案 B。

8. **A 公司：**

$50,000 × (Present Value of an Annuity Due, 10 periods, 10%)

= $50,000 × 6.75902 = $337,951

B 公司：

$100,000 + $25,000 × (Present Value of an Annuity Due, 16 periods, 5%) – $100,000 × (Present Value of 1, 10 periods, 10%)

= $100,000 + $25,000 × 11.37966 – $100,000 × 0.38554 = $345,938

C 公司：

$250,000 + $9,000 × (Present Value of an Annuity Due, 10 periods, 10%)

= $250,000 + $9,000 × 6.75902 = $310,831

C 清潔公司收款之現值最低，故諾貝爾公司應選擇與 C 清潔公司簽約。

9. A 買家：$23,000,000

B 買家：$15,000,000 + $ 9,500,000 × (Present Value of an 1, 2 periods, 12%)
= $15,000,000 + $9,500,000 × 0.79719 = $22,573,305

C 買家：$ 5,400,000 × (Present Value of an Annuity Due, 15 periods, 12%) × (Present Value of 1, 5 periods, 12%) = $5,400,000 × 7.62817 × 0.56743 = $23,373,644

C 買家所支付款項之現值最高，故應將資產銷售給 C 買家。

10. ×5 年底之金額
= $5,050,425 × (Future Value of an 1, 4 periods, 8%)
= $5,050,425 × 1.36049 = $6,871,053

×6 年~×10 年領取金額於×6 年初之現值
= $600,000 × (Present Value of an Annuity Due, 5 periods, 8%)
= $600,000 × 4.31213 = $2,587,278

×11 年~×25 年領取金額於×6 年初之現值
$6,871,053 – $2,587,278 = $4,283,775

×11 年~×25 年領取金額
= $4,283,775 ÷ [(到期年金現值 Present Value of an Annuity Due, 30 periods, 4%) × (Present Value of an 1, 5 periods, 8%)]
= $4,283,775 ÷ (17.98371 × 0.68058) = $350,000

11. 本利和之金額
＝$200,000 × (Future Value of an 1, 6 periods, 1%) × (Future Value of an 1, 8 periods, 1.5%) × (Future Value of an 1, 6 periods, 2.5%)＋$250,000 × (Future Value of an 1, 8 periods, 1.5%) × (Future Value of an 1, 6 periods, 2.5%)＋$300,000 × (Future Value of an 1, 6 periods, 2.5%)
＝$200,000x1.06152x1.12649x1.15969＋$250,000x1.12649x1.15969＋$300,000x1.15969
＝$951,851

12. 設第三期後每期顧客須付款 X 元
$20,000＋$10,000 × (Present Value of an Ordinary Annuity, 2 periods, 6%)
＋X × (Present Value of an Ordinary Annuity, 6 periods, 6%) × (Present Value of an 1, 2 periods, 6%)
＝$300,000
→$20,000＋$10,000x1.83339+Xx4.91732x0.89000＝$300,000
→X＝$59,790

流動資產包括作為正常營業週期之一部分而出售、消耗或實現之資產（例如存貨及應收帳款），即使不預期於報導期間後十二個月內實現亦然。應收分期帳款為企業預期於正常營業週期中收回變現之款項，符合流動資產之定義，故應全數於財務狀況表列為流動資產，唯須以現值表達