Announcements

- Exam #2 will be on Friday, July 12.
- Exam is over material from Chapters 7-9.
- An extra lab session will be offered from 2:30 – 5:00 on Thursday, July 11 in Faner 1032.
- A practice exam (no credit) is available in My Labs Plus. Work on this after you finish the homework and practice quizzes which do count for credit.

Formulas provided on exam:

$$A = P(1 + rt)$$

$$A = P(1 + i)^{nt}$$

$$A = d\left[\frac{(1+i)^{nt} - 1}{i}\right]$$

Amortization Formula

P = principal (amount borrowed)
$i = r/n$ = interest rate per compounding period
nt = number of installments
d = payment made at end of each period

$$P(1+i)^{nt} = d\left[\frac{(1+i)^{nt}-1}{i}\right]$$

This formula will not be provided separately. Combine the compound interest and savings formulas to get it.

1. You have $7000 that you invest at 9% simple interest. What is the balance after 14 years?

A) $12,390 B) $15,820 C) $63,000 D) $882,000

$$A = P(1 + rt) = 7000(1 + 0.09 \times 14)$$
$$= 7000(2.26)$$
$$= 15{,}820$$

2. You borrow $4000 on a 7.5% discounted loan for a period of 15 months. What is the amount of discount on this loan?

A) $300 B) $375 C) $415 D) $450

$$Prt = 4000 \times 0.075 \times 1.25 = 375$$

3. What is the actual rate of interest on this loan?

A) 7.5% B) 8.1% C) 8.3% D) 10.3%

$$rt = 375/(4000 - 375) = 375/3625 = 0.10345$$
$$r = 0.10345/1.25 = 0.08276$$

4. You have $7000 that you invest at 9%, compounded quarterly. What is the balance after 14 years?

A) $15,820 B) $24,336 C) $63,000 D) $63,882

$$i = 0.09/4 = 0.0225, \quad nt = 4 \times 14 = 56$$

$$A = P(1 + i)^{nt} = 7000(1 + 0.0225)^{56}$$

$$= 7000(3.476528)$$

$$= 24{,}336$$

5. Suppose you invest in an account that pays 6% interest, compounded quarterly. You would like your investment to grow to $8000 in 14 years. How much would you have to invest in order for this to happen?

A) $2125 B) $2290 C) $2650 D) $3475

$$A = P(1 + i)^{nt}$$

$$i = 0.06/4 = 0.015, \quad nt = 4 \times 14 = 56$$

$$8000 = P(1 + 0.015)^{56}$$

$$8000 = P(2.301963)$$

$$P = 8000/2.301963$$

$$= 3475$$

6. What is the effective annual rate (APY) for 10.2% compounded quarterly?

A) 9.5% B) 9.7% C) 10.2% D) 10.6%

How much interest on a $1 investment after 1 year?

$$P = 1,\ t = 1$$

$$i = 0.102/4 = 0.0255, \quad n = 4$$

$$(1 + i)^n - 1 = (1.0255)^4 - 1$$

$$= 0.1060$$

7. At the end of each month, Juanita deposits $100 into a savings account earning 11% interest compounded monthly. How much is the account worth at the end of five years?

A) $7952 B) $9827 C) $10,450 D) $11,150

$$A = d\left[\frac{(1+i)^{nt} - 1}{i}\right]$$

$i = 0.11/12 = 0.009167$, $nt = 12 \times 5 = 60$, $d = 100$

$100 \times (1.009167^{60} - 1)/0.009167 = 7952$

8. May takes out a conventional loan to purchase a car. The interest rate is 6.8% compounded monthly and May has six years to repay the $10,000 she borrowed. What are May's monthly payments?

A) $95.46 B) $139.33 C) $169.53 D) $290.15

$$P(1+i)^{nt} = d \times \left(\frac{(1+i)^{nt} - 1}{i} \right)$$

$i = 0.068/12 = 0.0056667$, $nt = 12 \times 6 = 72$, $P = 10{,}000$

$10{,}000 \times 1.0056667^{72} = d(1.0056667^{72} - 1)/0.0056667$

$d = 15{,}020.76/88.60170 = 169.53$

9. Suppose that a nine-member committee needs to elect one of the four alternatives. Their preference schedule is shown below. Which alternative is the head-to-head winner?

Number of Votes	4	3	2
First choice	A	B	C
Second choice	B	D	D
Third choice	C	A	B
Fourth choice	D	C	A

A) A B) B C) C D) D

10. Find the sum [12] + [23] in Z_{11}:

A) [2]
B) [1]
C) [9]
D) [5]

[12] + [23] = [35]

35 ÷ 11 = 3 R 2

35 ≡ 2 (mod 11)

11. Suppose that a linear code has codewords {000000, 001001, 010110, 011111, 100101, 101100, 110011, 111010}. Determine the maximum number of errors that can be detected.

A) 1

B) 2

C) 3

D) 6

12. Suppose that the generator matrix for a (4,8)-code is

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 & 1 \end{bmatrix}$$

Find the codeword corresponding to 1011.

A) 10111011
B) 10110011
C) 10110010
D) 10111010