1. Using the simplex method to Maximize $Z = x_1 + 4x_2 + x_3$
subject to

$$x_1 + x_2 + x_3 \leq 6$$
$$x_1 - x_2 - 2x_3 \leq 2$$
$$x_1,\ x_2,\ x_3 \geq 0$$

$Z = \ldots$

(a) 24 _____(correct)

(b) 20

(c) 22

(d) 28

(e) 30

2. In order to establish a sinking fund of \$125,000, how much will have to be invested at the end of each year at the rate of 11.2% compounded annually for 8 years?

(a) 10463.64 _____(correct)

(b) 10463.46

(c) 10462.85

(d) 10464.02

(e) 10464.61

3. Use the simplex method to Minimize $Z = 4x_1 + x_2$
subject to

$$\begin{aligned} x_1 + x_2 &\geq 5 \\ x_1 + 2x_2 &\geq 8 \\ x_1,\, x_2 &\geq 0. \end{aligned}$$

If the answer: $Z = a$ where $x_1 = b$, $x_2 = c$, then $a + b + c = \ldots$

(a) 10 _____ (correct)

(b) 12

(c) 8

(d) 13

(e) 9

4. If the Dual of the problem: Minimize $Z = 5x_1 + 4x_2$
subject to

$$\begin{aligned} -4x_1 + 3x_2 &\geq -10 \\ 8x_1 - 10x_2 &\leq 80 \\ x_1, x_2 &\geq 0, \end{aligned}$$

is given by:
Maximize $W = ay_1 + by_2$
subject to

$$\begin{aligned} cy_1 + dy_2 &\leq e \\ fy_1 + gy_2 &\leq h \\ y_1, y_2 &\geq 0. \end{aligned}$$

Then $b + d + h = \ldots$

(a) -84 _____ (correct)

(b) -88

(c) -4

(d) 5

(e) -92

5. Maximize $Z = 2x + 2y$
subject to

$$\begin{aligned} 2x - y &\geq -4 \\ x - 2y &\leq 4 \\ x + y &= 6 \\ x, y &\geq 0 \end{aligned}$$

Then the maximum is at the:

(a) points on the line segment AB, where $A\left(\frac{2}{3}, \frac{16}{3}\right)$ and $B\left(\frac{16}{3}, \frac{2}{3}\right)$ _____(correct)

(b) point $(4, 2)$ only

(c) points on the line segment AB, where $A(4, 2)$ and $B\left(\frac{5}{3}, \frac{13}{3}\right)$

(d) point $\left(\frac{13}{3}, \frac{5}{3}\right)$ only

(e) value of $Z = 16$

6. How many years will it take for money to triple at the effective rate of 5%?

(a) 23 _____(correct)

(b) 22

(c) 24

(d) 25

(e) 20

7. To what sum will \$2000 amount in eight years if invested at a 6% effective rate for the first four years and at 6% compounded semiannually thereafter (next four)?

   (a) 3198.54 (correct)
   (b) 2987.32
   (c) 3319.54
   (d) 3622.46
   (e) 3098.59

8. A bank account pays 5.3% annual interest, compounded monthly. How much must be deposited now so that the account contains exactly \$12,000 at the end of one year?

   (a) 11381.89 (correct)
   (b) 11383.89
   (c) 11379.99
   (d) 11380.88
   (e) 11382.99

9. A owes B the sum of \$5000 and agrees to pay B the sum of \$1000 at the end of each year for five years and a final payment at the end of the sixth year. How much should the final payment be if interest is at 8% compounded annually?

(a) 1598.44 (correct)

(b) 1597.99

(c) 1597.44

(d) 1598.77

(e) 1597.88

10. A debt of \$5000 due five years from now and \$5000 due ten years from now is to be repaid by a payment of \$2000 in two years, a payment of \$4000 in four years, and a final payment at the end of six years. If the interest rate is 2.5% compounded annually, how much is the final payment?

(a) 3244.63 (correct)

(b) 3244.82

(c) 3246.45

(d) 3246.49

(e) 3245.01

11. An initial investment of \$20,000 in a business guarantees the following cash flows:

Year	Cash flow
5	$\$13,000$
6	$\$14,000$

Assume an interest rate of 4% compounded semiannually. Discuss the net present value of the cash flows.

(a) Profitable with NPV = 1703.43 _____ (correct)

(b) Profitable with NPV = 1700.44

(c) Not profitable with NPV = −1703.43

(d) Not profitable with NPV = −1700.44

(e) Not profitable with NPV = −1700.43

12. If interest is compounded continuously at an annual rate of 7%, how many years would it take for a principal P to triple?
Give your answer to the nearest year.

(a) 16 _____ (correct)

(b) 15

(c) 14

(d) 17

(e) 18

13. Given the annuity: \$150 paid at the beginning of each month for five years at the rate of 7% compounded monthly. Find the present value of the given annuity.

(a) 7619.49 (correct)

(b) 7618.38

(c) 7618.36

(d) 7619.41

(e) 7618.44

14. A machine is purchased for \$3000 down and payments of \$250 at the end of every six months for six years. If interest is at 8% compounded semiannually, find the corresponding cash price of the machine.

(a) 5346.27 (correct)

(b) 5345.98

(c) 5346.88

(d) 5345.95

(e) 5345.79

15. A company personnel director must hire seven people; four for the assembly department and three for the shipping department. There are 10 applicants who are equally qualified to work in each department. In how many ways can the personnel director fill the positions?

(a) 4200 (correct)

(b) 1400

(c) 25200

(d) 720

(e) 15600

16. In a 10-question examination, each question is worth 10 points and is graded right or wrong. Considering the individual questions, in how many ways can a student score 80 or better?

(a) 56 (correct)

(b) 64

(c) 48

(d) 72

(e) 81

17. If E and F are events for an experiment, then $(E \cap F) \cap (E \cap F') =$

(a) $\emptyset$ _____ (correct)
(b) E
(c) F
(d) E'
(e) F'

18. Three dice are rolled, and the SUM of numbers that turn up is observed. Determine the number of sample points

(a) 16 _____ (correct)
(b) 27
(c) 6^3
(d) 3^6
(e) 18