1. Using the simplex method:
   Minimize

$$Z = 6x_1 + 4x_2$$

   Subject to

$$\begin{aligned} x_1 + x_2 &\leq 1 \\ -x_1 + x_2 &\geq -3 \\ x_1, x_2 &\geq 0 \end{aligned}$$

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

   (a) 7
   (b) 8
   (c) -7
   (d) -8
   (e) 6

2. Using the simplex method:
   Maximize

$$Z = 2x_1 + x_2$$

   Subject to

$$\begin{aligned} x_1 - x_2 &\leq 1 \\ 5x_1 + 4x_2 &\leq 20 \\ x_1 + 2x_2 &\leq 8 \\ x_1, x_2 &\geq 0 \end{aligned}$$

   Then, $Z =$

   (a) 7
   (b) 9
   (c) 10
   (d) 6
   (e) 14

3. How many six-letter words from the letters in the word MEADOW are possible if no letter is repeated?

   (a) 720
   (b) 120
   (c) 600
   (d) 72
   (e) 360

4. In a horse race, a horse is said *to finish in the money* if it finishes in first, second, or third place. For an eight-horse race, in how many ways can the horses finish in the money? Assume no ties.

   (a) 56
   (b) 336
   (c) 6
   (d) 120
   (e) 280

5. The director of research and development for a company has six scientists who are equally qualified to work on projects A, B, and C. In how many ways can the director assign two scientists to each project?

   (a) 90
   (b) 60
   (c) 180
   (d) 18
   (e) 9

6. A student must take mathematics course, a laboratory science course, and a humanities course. The available mathematics classes are category theory, measure theory, and real analysis. The laboratory science possibilities are astronomy, biology, chemistry, geology and physics. In humanities, the available courses are classics, English, French, and history. How many three-course selections can the student make?

   (a) 60
   (b) 48
   (c) 45
   (d) 36
   (e) 27

7. If the dual of the problem:
Maximize

$$Z = 2x_1 + x_2 - x_3$$

Subject to

$$\begin{gathered} 2x_1 + 2x_2 \leq 3 \\ -x_1 + 4x_2 + 2x_3 \leq 5 \\ x_1,\, x_2,\, x_3 \geq 0 \end{gathered}$$

is given by
Minimize

$$W = ay_1 + by_2$$

Subject to

$$\begin{gathered} cy_1 + dy_2 \geq e \\ fy_1 + gy_2 \geq h \\ iy_1 + jy_2 \geq k \\ y_1,\, y_2 \geq 0 \end{gathered}$$

Then $ab + cfi =$

(a) 15
(b) 13
(c) 17
(d) 7
(e) 8

8. How many would it take for a principal of P to triple if money is worth 72% compound monthly?
(the answer to the nearest month).

(a) 19 month
(b) 18 month
(c) 17 month
(d) 16 month
(e) 20 month

9. The nominal rate of interest compounded quarterly is corresponds to an effective rate of 5.5%.

(a) 5.39%
(b) 5.55%
(c) 4.39%
(d) 6.39%
(e) 4.55%

10. An initial investment of \$20000 in a business guarantees the following cash flows: Assume an interest rate of 8% compounded semi annually

Year	Cash flow
5	\$12,000
8	\$16,000
10	\$17,000

then the net present value of the cash follows:

(a) \$4407.9
(b) \$4507.9
(c) \$5447.9
(d) \$4467.9
(e) \$4307.9

11. A debt of \$6000 due in four years is to be repaid by a payment of \$2000 now and a second payment at the end of four year, then the second payment be if the interest rate is 6% compounded monthly is

(a) \$3459
(b) \$3559
(c) \$3659
(d) \$4459
(e) \$2000

12. If interest is compounded continuously at an annual rate of 7%, then the number of years would it take for a principal P to double is

(a) 10
(b) 8
(c) 9
(d) 6
(e) 11

13. If \$8000 is used to purchase an annaity consisting of equal payments at the end of each year for the next four years and the interest rate is 5% compounded annually, then the amount of each payment is

(a) \$2256.1
(b) \$2356.1
(c) \$2456.1
(d) \$3256.1
(e) \$2556.1

14. The future value of an annuity consisting of payments of \$60 at the end of every four months for four years at rate of 6% compounded quarterly is

(a) \$1075.9
(b) \$1165.9
(c) \$1475.9
(d) \$1275.9
(e) \$10995.9

15. Given
Maximize

$$Z = 2x + 2y$$

Subject to

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

The maximum is at:

(a) All points on the line segment ab where $a\left(\frac{2}{3}, \frac{16}{3}\right)$ and $b\left(\frac{16}{3}, \frac{2}{3}\right)$

(b) The point $\left(\frac{2}{3}, \frac{16}{3}\right)$ only

(c) The point $(4, 2)$ only

(d) The points $\left(\frac{2}{3}, \frac{16}{3}\right)$ and $\left(\frac{16}{3}, \frac{2}{3}\right)$

(e) All points on the line segment ab where $a(2, 4)$ and $b(4, 2)$