Math 1311
Homework 3 (Section 2.1 – Section 2.3)

Record your answers to all the problems in the EMCF titled **" Homework 3"** .

1. One model for the number of students enrolled in U.S. public high schools as a function of time since 1986 is N = $0.05t^2 - 0.42t + 12.33$. Here N is the enrollment in millions of students, t is the time in years since 1986, and the model is relevant from 1986 to 1996. Explain in practical terms what N(3) means and calculate that value.
   a) Number of students in year 1989, 11.52 million
   b) Number of students in year 1990, 11.45 million
   c) Number of students in year 1991, 12.32 million
   d) Number of students in year 1988, 1.91 million

2. The profit P, in thousands of dollars, that a manufacturer makes is a function of the number N of items produced in a year, and the formula is
   P = $-0.15N^2 + 9N - 18$. Determine the two break-even points for this manufacturer, that is, the two production levels at which the profit is almost zero.
   a) 60 and 4
   b) 58 and 2
   c) 61 and 5
   d) 62 and 6

3. An enterprise rents out paddleboats for all-day use on a lake. The owner knows that he can rent out all 30 of his paddleboats if he charges $2 for each rental. He also knows that he can rent out only 29 if he charges $3 for each rental and that, in general, there will be 1 fewer paddleboat rental for each extra dollar he charges per rental. What would the owner's total revenue be if he charged $5 for each paddleboat rental?
   a) $60
   b) $135
   c) $145
   d) $66

4. You own a motel, and have a pricing structure that encourages rentals of rooms in groups. One room rents for $42, two rooms rent for $40 each, and in general the group rate per room is found by taking $2 off the base of $42 for each extra room rented. Use a formula to give the rate you charge for each room if you rent n rooms to an organization.
   a) R(n) = 42 - (n + 2)
   b) R(n) = 42 - 2(n - 1)
   c) R(n) = 42 + (n - 2)
   d) R(n) = (n - 2) x (42 - 5)

5. Section 2.1 Exercise 6a

a) $N(2) = 11.69$ million students

b) $N(3) = 11.52$ million students

c) $N(4) = 11.45$ million students

d) $N(5) = 11.48$ million students

6. Section 2.1 Exercise 6b
   a) Student enrollment since 1993; 11.75 million
   b) Student enrollment since 1990; 14.56 million
   c) Student enrollment since 1995; 13.15 million
   d) Student enrollment since 1994; 12.17 million

7. Section 2.1 Exercise 6c
   a) 1989
   b) 1990
   c) 1992
   d) 1994

8. Section 2.1 Exercise 18a
   a) 10
   b) 20
   c) 30
   d) 40

9. Section 2.1 Exercise 18b

a) 74.47; population of the foxes after 5 years
b) 76.58; population of the foxes after 3 years
c) 98.63; population of the foxes after 8 years
d) 85.23; population of the foxes after 10 years

10. The resale value V, in dollars of a certain car is a function of the number of years t since the year 2015. In the year 2015 the resale value is $ 50,000, and each year thereafter the resale value decreases by $2700. What is the value in the year 2016?
    a) 42,000
    b) 33,300
    c) 47,300
    d) 48.500

11. Using the information from question 10, find a formula for V as a function of t.

a) $V = 27{,}000 - 5000t$
b) $V = 50{,}000 - 2700t$
c) $V = 30{,}000 - 1700t$
d) $V = 2700 - 50{,}000t$

12. Using the information from question 10. Use functional notation to express the resale value in the year 2020, and calculate that value.

a) $V(3)$;11,800
b) $V(5)$;13, 000
c) $V(7)$;15,600
d) $V(5)$;36,500

13. Section 2.2 Exercise 6c

a) 420
b) 535
c) 420 thousand
d) 535 thousand

14. Section 2.2 Exercise 6d

a) 1.9 widgets OR 23.05 widgets
b) 3500 widgets OR 15000 widgets
c) 1952 widgets OR 23047 widgets
d) 3.5 widgets OR 1.5 widgets

15. Section 2.2 Exercise 6e

a) 444 thousand
b) 335 thousand
c) 100 thousand
d) 565 thousand

16. Solve $6 - 7x = 11 + 31x$ for x.

a) 0.45
b) –0.13
c) 0.21
d) –4.25

17. Reverse the roles of the variables by solving $a = 4bc + ba$ for b.

a) $b = a(4c + a)$

b) $b = \frac{a}{(4c + a)}$

c) $b = 2a + 4c$

d) $b = 4ac$

18. The number J, in thousands, of cans of frozen orange juice sold weekly is a function of the price P, in dollars, of a can. In a certain grocery store, the formula is

$$J = 11 - 2.5P.$$

Express the number of cans sold weekly using function notation if the price of a can is \$1.56, and then calculate that value.

a) $J(1.56) = 7102$ cans
b) $J(1.56) = 1260$ cans
c) $J(1.56) = 7103$ cans
d) $J(1.56) = 7100$ cans

19. We are to buy quantities of two items: n_1 units of item 1 and n_2 units of item 2. An *isocost equation* shows the relationship between the number of units of each of two items to be purchased when the total purchase price is predetermined. If the total purchase price is predetermined to be $C = 155$ dollars, and item 1 costs \$5.87 per unit and item 2 costs \$3.61 per unit, find the isocost equation for items 1 and 2.

a) $5.87n_1 - 3.61n_2 = 155$
b) $3.61n_1 + 5.87n_2 = 155$
c) $(5.87 + 3.61)(n_1 + n_2) = 155$
d) $5.87n_1 + 3.61n_2 = 155$

20. According to an Oklahoma Income Tax table for 2004, the income tax owed by an Oklahoma resident who is married and filing jointly with a taxable income above $50,000 is $3850 plus 10% of the taxable income over $50,000. What is the tax on a taxable income of $76,800?

a) $6530
b) $6030
c) $7530
d) $11,530