

MA 110

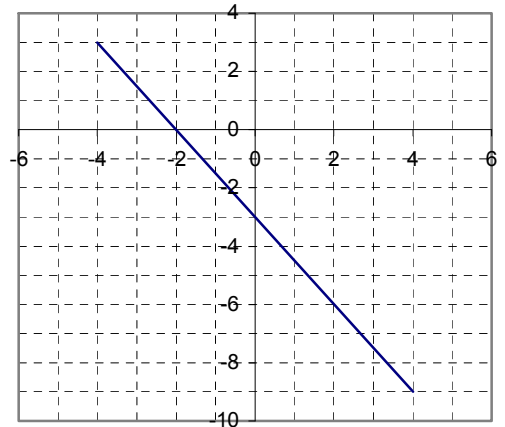
REVIEW PROBLEMS

Vj ku'tgxkgy 'ku'v'cee qo r cp { 'vj g'eqwtug'vz v'j j kej 'ku'Hkpkx'O cvj go cv'keu'hqt 'Dwukpguu.'Geqqo keu.'Nkg' Uekpegu.'cpf 'Uqekri'Uekpegu.'33' 'Gf k'kqp'd { 'Dctpgw.\ kgi rgt.'( 'D{ rggp'cpf 'r wdrkij gf 'd { 'Rgctuqp'Rt gpv'eg' J cm0"

30 Hkpf 'vj g'unqr g'cpf '{ /kpvtegr v'hqt"  
 c+" { = -7z + 57 "  
 d+" z - 5 { = 32 "

40 Hkpf 'vj g'gs wcvkqp'qh'vj g'hkpg"  
 c+" y kj '{ /kpvtegr v'7'cpf 'unqr g'63 40'  
 d+" y kj 'unqr g'2'cpf '{ /kpvtegr v'40'  
 e+" y kj 'unqr g'v'pf ghkpgf 'cpf 'r cuukpi 'vj tqwi j 'vj g'r qkpv'5.8+0'  
 f+" y kj 'unqr g'6'cpf 'r cuukpi 'vj tqwi j '\*4./5+0'  
 g+" r cuukpi 'vj tqwi j '\*3./4+cpf '\*5.7+0'  
 h+" r cuukpi 'vj tqwi j '\*7.'8+'vj cv'ku'xgt v'ecrf'  
 i+" r cuukpi 'vj tqwi j '\*7.'8+'vj cv'ku'j qtk qpwr0 "

50 Wug'vj g'i ter j 'qh'vj g'hkpg'qp'vj g'tki j v'v'q'hkpf 'vj g'hqmqy kpi <"  
 "c+" vj g'z/kpvtegr v'  
 "d+" vj g'{/kpvtegr v'  
 "e+" vj g'unqr g"  
 " f+" vj g'unqr g' /kpvtegr v'hqto 'qh'vj g'gs wcvkqp'qh'vj g'hkpg0"



60" C'r rcpv'ecp'o cpw'cewtg': 2'i qh'ewdu'r gt 'f c { 'hqt'c'v'qcnf ckn' "equv'qh'"&9.869'cpf '322'i qh'ewdu'r gt"  
 " f c { 'hqt'c'v'qcnf ckn' "equv'qh'& .3690"  
 " c+" Cuwo kpi 'vj cv'v'qcnf ckn' "equv'E.'cpf 'r tqf wcvkqp.'z.'ctg'hkpgctn' 'tgrv'gf.'hkpf 'vj g'v'qcnf ckn' "equv' qh'r tqf wv'kpi 'z'i qh'ewdu0"  
 " d+" I ter j 'vj g'v'qcnf ckn' "equv'hqt"2 ≤ z ≤ 422 0"  
 " e+" Y tkg'c'ugpv'peg'vj cv'kpvtr tgv'vj g'unqr g0'  
 " f+" Y tkg'c'ugpv'peg'vj cv'kpvtr tgv'vj g'{/kpvtegr v0'  
 " g+" Wug'vj ku'o qf gr'v'q'r tgf kv'vj g'v'qcnf ckn' "equv'y j gp'392'i qh'ewdu'ctg'o cpw'cewtg' 0"

70 C'o kf f mg'gcuv'gtp'eqwpt { 'g'zr qt w'c'eqpucpv'co qwpv'qh'qkn'gcej '{ gct'v'q'ku'qkn't gugt'xgu'j' cxg'dggp' f getg'cukpi 'hkpgctn' 'y kj 'v'o g'cee'qtf kpi 'v'q'vj g'gs wcvkqp' "{ = -36v + 572 'y j gtg'/'tgr t'gugpw'vj g'eqwpt { u)" t'gugt'xgu'k'p'o kn'k'qpu'qh'dctt'gnu'v'v' gctv'ch'gt'42220"  
 c+" F g'gto k'pg'cpf 'kpvtr tgv'vj g'unqr g'qh'vj ku'v'v'v'ckij v'v'kpg0'  
 d+" F g'gto k'pg'vj g'{/kpvtegr v'cpf 'g'zr r'k'p'ku'uki p'h'ecpeg0'  
 e+" Hkpf 'vj g'co qwpv'qh'qkn'k'p'vj g'eqwpt { u't'gugt'xgu'k'p'42270"  
 f+" K'v' ku'v'v'v'gpf "eqp'v'pw'gu.'y j gp'y kn'vj g'qkn't'wp'q'wv'A"

6. The data in the following table relate study time and test scores.

Study Time (in hours)	Test Grade (in percent)
19	83
20	85
21	88
22	91

- Use your graphing calculator to find the equation of the linear regression model for the given data.
  - Use the regression line in (a) to predict the test grades after only 10 hours of study.
  - Write a sentence to interpret the slope of your model.
  - Write a sentence to interpret the y-intercept of your model.
7. The research department in a company that manufactures AM/FM clock radios established the following price-demand and cost functions:

$$p(x) = 50 - 1.25x$$

$$C(x) = 160 + 10x$$

where  $x$  is in thousands of units,  $p(x)$  is in dollars, and  $C(x)$  is in thousands of dollars.

Both functions have domain  $1 \leq x \leq 40$ .

- Write the revenue function,  $R(x)$ , for this situation.
  - Determine the break-even points algebraically.
  - For what outputs will a loss occur?
  - For what outputs will a profit occur?
  - Determine the maximum profit and the output that produces the maximum profit.
  - What is the wholesale price of the radio at the output that produces maximum profit?
8. Given  $f(x) = -0.4x^2 + 3.2x + 1.2$ . Find:
- |                                      |                            |
|--------------------------------------|----------------------------|
| a) the y-intercept;                  | d) the maximum or minimum; |
| b) the x-intercepts in radical form; | e) the range;              |
| c) the vertex;                       | f) sketch a graph.         |
9. If an investor buys a 39 week T-bill with a maturity value of \$25,000 for \$23,031, what simple annual interest rate will the investor earn? (Express your answer as a percentage, correct to one decimal place.)
10. An investor purchases a 50-day T-bill with a maturity value of \$10,000 that earns a simple annual interest rate of 5.53%.
- What is the purchase price if a 360-day year is used?
  - What is the purchase price if a 365-day year is used?
11. \$5,000 is invested at 12%. How much will be in the account 6 years from now if interest is compounded:
- quarterly;
  - weekly.
12. How much money would you have to put into an account initially in order to have \$5000 after 15 years if the account pays 6% interest compounded semi-annually?
13. Which is the better investment and why: 9% compounded quarterly or 9.25% compounded annually?

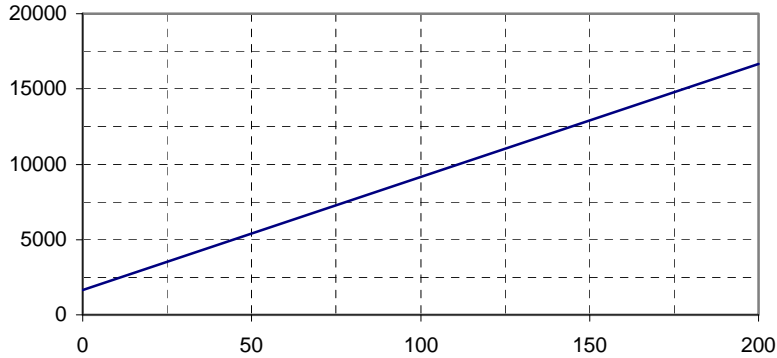
40. A department store receives a shipment of 31 new cell phones. There are 2 defective cell phones in the shipment.
- If one cell phone is selected from the shipment, what is the probability that it is defective?
  - Suppose this shipment of 31 cell phones with 2 defective is representative of a much larger set of 2500 cell phones. How many defective cell phones would you expect in this larger set of 2500?
41. A group of 10 people consists of 5 men and 5 women. A committee of 4 is chosen from this group. What is the probability that one or more of the committee members is a man?
42. A class of 40 students has 10 honor students and 13 athletes. Three of the honor students are also athletes. One student is chosen at random. Find the probability that this student is an athlete if it is known that the student is not an honor student.
43. An experiment consists of rolling two fair dice and adding the dots on the two sides facing up. Assuming each simple event is as likely as any other, find the probability of the sum of the dots indicated.
- Sum is 2.
  - Sum is divisible by 2.
  - Sum is divisible by 3.
  - Sum is divisible by 2 and 3.
  - Sum is divisible by 2 or 3.
44. Companies A, B and C produce 10%, 40% and 50% respectively of the automobiles sold in a certain region. In that region, 2% of company A's cars, 1% of B's cars and 3% of C's cars have been recalled. Suppose an automobile that has been recalled is selected at random. What is the probability (to the nearest hundredth) that it was sold by Company B?
45. Mice in a certain experiment involving a choice between path A and B are observed to have the following pattern:  
Of those who choose path A one day, 30% choose A the next day and 70% choose B, while of those who choose B one day, 80% choose B the next day and 20% choose A.
- Set up the transition matrix for this situation.
  - If 50% choose A on Monday and 50% choose B, what percentages choose each path on Tuesday? On Wednesday?
  - In the long run, what portion of the mice choose A each day and what portion choose B?

\*\*\*\*\*ANSWERS FOR MA 110 REVIEW PROBLEMS\*\*\*\*\*

1. a) slope =  $m = -5$ , y-intercept =  $b = 35$                       b)  $m = \frac{2}{3}$ ,  $b = \frac{-10}{3}$
2. a)  $y = -\frac{1}{2}x + 5$                       b)  $y = 2$                       c)  $x = 3$
- d)  $y = -4x - 11$                       e)  $y = -\frac{7}{4}x - \frac{1}{4}$                       f)  $x = -5$                       g)  $y = 6$

3. a)  $(-2, 0)$       b)  $(0, -3)$       c)  $m = \frac{-3}{2}$       d)  $y = \frac{-3}{2}x - 3$

4. a)  $C(x) = 75x + 1647$   
b)



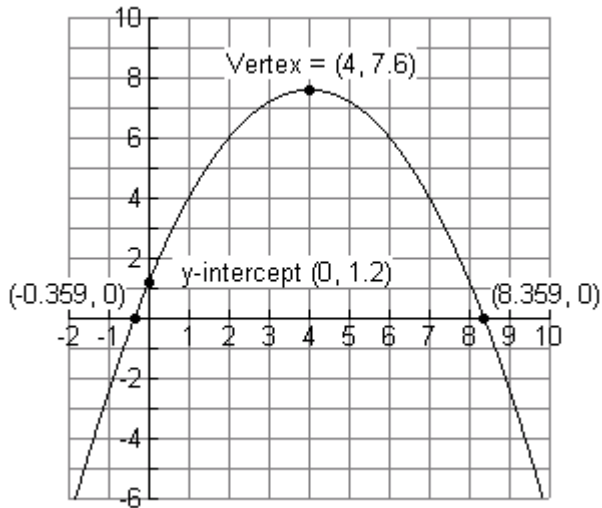
- c) According to this model, when the number of golf clubs manufactured is increased by one the daily cost is increased by \$75.
- d) According to this model, the fixed cost is \$1,647.
- e)  $C(170) = \$14,397$

5. a) slope = -14; Starting with the year 2000, the country exports 14 million barrels of oil per year.  
b) y-intercept:  $(0, 350)$ ; In the year 2000 the country had 350 million barrels of oil in its reserves.  
c) 280 million barrels;  
d) in the year 2025

6. a)  $y = 2.7x + 31.4$       b) 58.4%  
c) The slope of 2.7 means for each additional hour of study the test score will increase by 2.7%  
d) The y-intercept of 31.4 means that if the student did not study the test score would be 31.4%

7. a)  $R(x) = x(50 - 1.25x) = 50x - 1.25x^2$  (  $R(x)$  is in thousands of dollars.)  
b) Break-even occurs when outputs are  $x = 16 \pm 8\sqrt{2}$  thousand units; that is:  
 $x = 16 - 8\sqrt{2} \approx 4.686$  thousand units = 4,686 units and  
 $x = 16 + 8\sqrt{2} \approx 27.314$  thousand units = 27,314 units.  
c) Loss occurs for  $1 \leq x < 4.686$  or  $27.314 < x \leq 40$   
d) Profit occurs for  $4.686 < x < 27.314$   
e) \$160,000; 16,000 units  
f) \$30

8. a)  $(0, 1.2)$  b)  $(4 + \sqrt{19}, 0)$ ,  $(4 - \sqrt{19}, 0)$  c)  $(4, 7.6)$  d) maximum: 7.6 e)  $y \leq 7.6$  or  $(-\infty, 7.6]$   
f)



9. 11.4%                      10. a) \$9,923.78    b) \$9,924.82
11. a) \$10,163.97                      b) \$10,263.65
12. \$2,059.93 matures to \$4,999.99 so to ensure a maturity value of \$5,000 or more the answer is \$2,059.94
13. 9% compounded quarterly is an effective rate of 9.31%.  
9.25% compounded annually is an effective rate of 9.25%  
∴ 9% compounded quarterly is better.
14. a) 48 months    b) 3.919 years
15. \$14,147.09
16. a) \$111,107.61                      b) \$722,278.24
17. a) \$2,338.25    b) \$451,770
18. 243
19. a)  $x = 5$ ,  $y = -7$     b)  $x = 11$ ,  $y = -12$     c) No solution (Inconsistent system)
- d) Infinitely many solutions. (Dependent system.)  
Using parameter  $t$ , the solution is  $x = t$ ,  $y = \frac{3}{5}t - 3$ , where  $t$  is any real number.
20. Equilibrium price: \$30 per unit;    Equilibrium quantity: 50 units