1.01

Notes

A. 0.63

B. 30.2 & 32.6 mph

C. Re-write expressions as: $(2^4)^{25}$, $(3^3)^{25}$, $(5^2)^{25}$
Evaluate within the parentheses; 16^{25}, 27^{25}, 25^{25}

D. $P_5 = \frac{1}{9}$; Domain = {2, 3, … , 12};

Range = $\left\{\frac{1}{36}, \frac{2}{36}, \ldots, \frac{6}{36}\right\}$

E. $11\sqrt{3}$

F. $\sqrt{2}$

G. $10 - \sqrt{2}$

H. $3 + \sqrt{3}$

I. $\frac{5^3 \times 3^6}{2^6} = \frac{91125}{64}$

J. 9

K. See 1.01C

L. $\frac{8 - 6x^3}{3x^3}$ or $\frac{8}{3}x^{-3} - 2$

1.02

A. $2x^2 - \frac{10}{3}x - 1$

B. $8x^4$

C. $2b - 3a$

D. $c^2 - 6c - 16$

E. $a^3 - 9a^2 + 11a + 21$

F. $x^4 - 2x^3 - 3x^2$

G. $7x^2 - 3x - 8$

H. $16a^6$

I. $4x^2y - 3y^4 + 10$

J. $y^5 - 2y^4 - 5y^3 + 9y^2 + 5$

K. $-24a^6b^{12}$

L. $3x^2y^2 - 6x^2y + 4x^5y^4$

M. $3w^2 - 2w^3$

$10w^3 - 15w^4 + 6w^5$

$35w^4 - 84w^5 + 70w^6 - 20w^7$

N. $1 - 3x + 3x^2 - x^3$

$3x - 6x^2 + 3x^3$

$3x^2 - 3x^3$

x^3

O. $-0.11x^2 - 4.27x + 12.46$

Notes

1.03

Notes

A. $(x + 10)(x - 10)$

B. $(x - 6)(x + 2)$

C. $(3x + 1)(x - 1)$

D. $(3y + 2)(y + 7)$

E. $(5m - 8n)(4m + n)$

F. $8xy(x - 3 - 5xy)$

G. $x(x + 3)(x + 2)$

H. ±11, ±13, ±17, ±31

I. 4, 2, 0, -10, -18, -26, -144, others

J. $4x^2 + 2x - 20 = (2x + 5)(2x - 4) = (4x + 10)(x - 2)$

$6x^2 + 2x - 20 = (2x + 4)(3x - 5) = (x + 2)(6x - 10)$

$18x^2 + 2x - 20 = (18x + 20)(x - 1) = (9x + 10)(2x - 2)$

$22x^2 + 2x - 20 = (22x - 20)(x + 1) = (11x - 10)(2x + 2)$

2.01

Notes

A. Williams (158.4), Durant (135.1),
Clark (122.5), Pinkney (119.1), etc.

B. $1800.58

C. From Charlotte, about 3.6 hours.

D. 17 minutes

E. 12.3%

2.02

A. 20-sided polygon generates 17 vertices;
D = S - 3

B. 20-sided polygon generates
170 diagonals; for each additional side, the number of additional diagonals increases by one. ($D = 0.5S^2 - 1.5S$ is the algebraic model)

C. P = T + 2

P = 2S + 2

P = 4H + 2

P = 6G + 2

P = 4S + 4

P = 8S + 4

D. A = 8T - 2

V = 2T - 1

A = 16T - 10

V = 5T - 4

3.01

Notes

A. $138.75

B. $18,560 = 1.08C
$17,185 = C

C. **NC Tax Schedule**
$T = 0.06I$; $I \leq 12{,}750$; $T \leq 765$

$T = 765 + 0.07(I - 12{,}750)$;
$12{,}750 < I \leq 60{,}000$;
$765 < T \leq 4{,}072.50$

$T = 4{,}072.50 + 0.0775(I - 60{,}000)$;
$60{,}000 < I \leq 120{,}000$;
$4{,}072.50 < T \leq 8{,}722.50$;

$T = 8{,}722.50 + 0.0825(I - 120{,}000)$
$I > 120{,}000$; $T > 8{,}722.50$

Federal Tax Schedule
$T = 0.10I$; $I \leq 7{,}150$: $T \leq 715$

$T = 600 + 0.15(I - 7{,}150)$;
$7{,}150 < I \leq 29{,}050$;
$715 < T \leq 4{,}000$

$T = 4{,}000 + 0.25(I - 29{,}050)$;
$29{,}050 < I \leq 70{,}350$;
$4{,}000 < T \leq 14{,}325$

$T = 14{,}325 + 0.28(I - 70{,}350)$;
$70{,}350 < I \leq 146{,}750$;
$14{,}625.00 < T \leq 35{,}717$

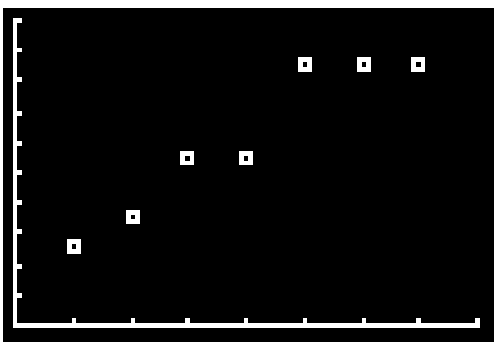
$T = 35{,}717 + 0.33(I - 146{,}750)$;
$146{,}750 < I \leq 319{,}100$;
$35{,}717 < T \leq 92{,}592.50$

$T = 92{,}592.50 + 0.35(I - 319{,}100)$;
$I > 319{,}100$; $T > 92{,}592.50$

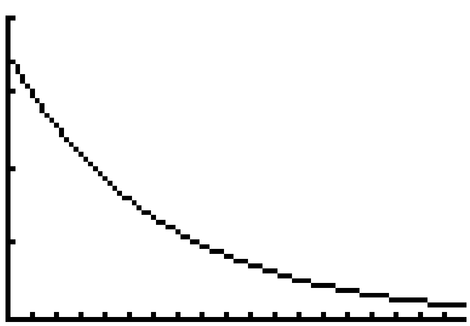
$1742.50; $3915; $6210

3.02

A. The longer a student is in college, the more money available. The domain (independent variable) is the years of college and the range (dependent variable) is the money available for loans. The data indicates an increasing function. Whether you create a scatterplot of school year versus loan amount or total years of school versus cumulative total of loan, it will look generally linear. However, with linear relationships there would be a constant change in the money from year to year. A system of linear relations would probably be the best description.



B. As the number of years increase, the value of the car decreases.
Time is the domain (independent variable) and value is the range (dependent variable). The value of the car changes most the first year; it changes the least as it approaches "scrap metal" status (gets old).



Notes

C. Both sets of data are decreasing over time; the men's times are all less than the corresponding women's times.

Strength, conditioning, technique, and practice are some variables that affect athlete's performance.

(**x = 24** for 1924)
Men: **T = -1.173x + 330**;
Women: **T = -1.656x + 389.5**

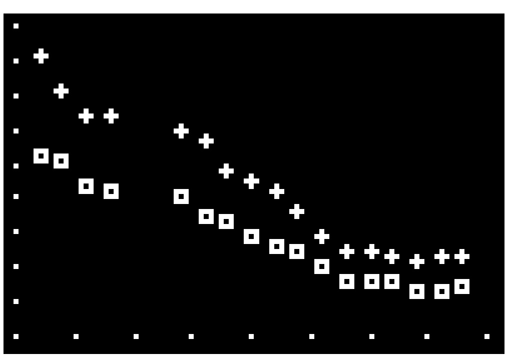
The steeper slope in the women's relation indicates women's times are improving quicker than men's.

Predicted times: men, 212.7; women, 223.9

2000 Results:
Men: 220.59
Women: 245.80

If the linear models predicted future performance the women's time would equal or exceed the men's time at the 2024 Olympics.

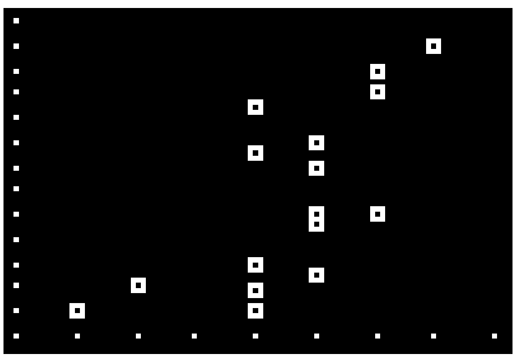
The research should be interesting although it appears both men's and women's performances may have peaked.



Notes

3.03

A. Independent: age; dependent: price
Other independent variables could be mileage and condition of the vehicle.
Domain: introductory model year to the present.
Range: scrap metal value to the new vehicle price.
Because the advertised price varies for several years, the relationship between age and value is not a function.
The data is an increasing relation not necessarily linear. Too much spread in the data for several of the years for a dependable linear best-fit.



Notes

B. The CD data are a function since each type of CD has only one interest rate available. The length of the CD is the independent quantity and interest rate is the dependent quantity.
Some other variables affecting the data could be the bank's assets, interest rates set by the federal government, and rates on loans.
As shown, the domain is 6-60 months and the range is 2.50-4.50 percent.
There are three-month CDs at some banks and the interest rates do change regularly.

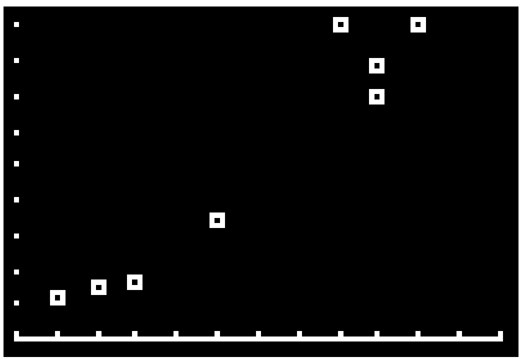
C. Population with internet access is the dependent variable and prices for computers and internet access are the independent variables. Other independent variables could be training and general interest or need.
Students should research current prices for computers and internet service to establish a current domain. The upper boundary of the range would approach 100% of the population.

Notes

3.04

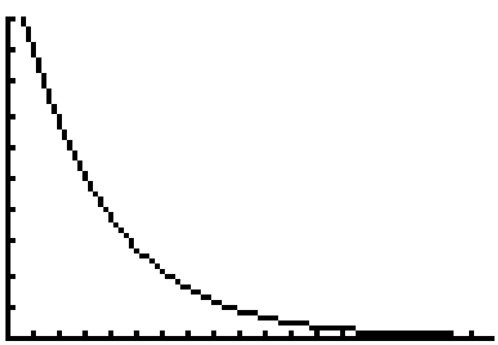
Notes

A. Independent variables are age, condition, mileage, and general appearance.
The domain would be the introductory model year for the car to the present.
The range would be its scrap metal value up to the new car price.
Two prices for the 1997 models make the data a relation.



B. Graphs will vary; all should be decreasing.

C. A decreasing function approaching zero as x increases; 24 will receive prize money.



3.05

Notes

A. $7300

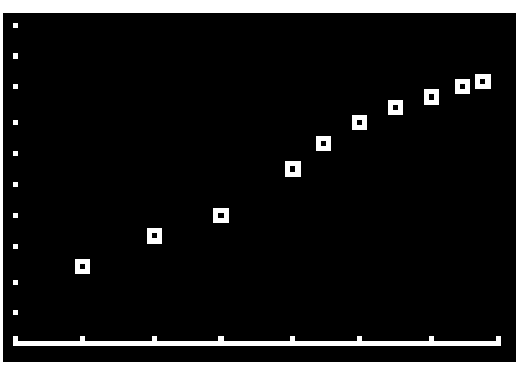
B. 658,000 pilots by 2002; (let **x = 0** for 1996) **P = 6000x + 622,000**.

C. 780,802 specialists by 2006; (let **x = 0** for 1998) **S = 43935.8x + 429,316**

D. US: -0.22% per year; NC: -1.74% per year

E. If $28 is the annual increase, students will pay $926 in 2001: 28 is the slope.

F. **y = 1.074x + 23.163**, where **y** is the percent of Americans with at least four years of high school. The slope is a 1.074 percentage point increase in the number of Americans each year completing four years of high school. Family responsibilities and dissatisfaction with school are two variables that affect the number finishing high school. Some variables that have changed since 1940 are more young people wanting to pursue post-secondary education and the increased education requirements in the workplace.



3.06

A. 8357 cubic feet

B. November, 2003

C. **$E = -0.03015m + 0.9517$** (**$m \geq 0$**) where **E** is the Euro's value in US dollars and **m** is the months since the beginning of the year.

According to the model, the Euro is worth \$0.5899 at the end of the year.

\$500 will convert to 847.60 Euros at the end of the year.

D. **$A = 0.019x + 0.593$** (**$x = 0$** for 1980)

(2001, 0.992), (2002, 1.011),
(2003, 1.03), (2004, 1.049),
(2005, 1.068)

Look at the data for the period 1980-2000 and decide whether a linear model is reasonable.

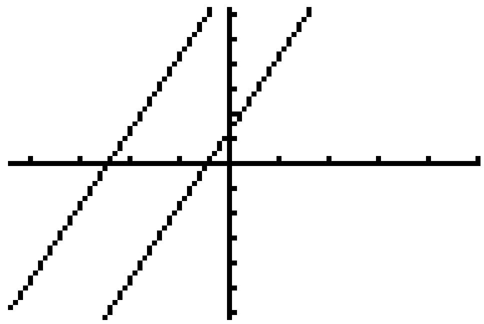
3.07

A. The x-intecept moves to the left.

B. The x-intecept increases, moving to the right. The line is parallel, moving "up" the y-axis.
The x-intercept approaches zero.
The line is parallel to the original but crosses the y-axis at **-b**.
The line flattens out approaching horizontal at **$y = b$**.

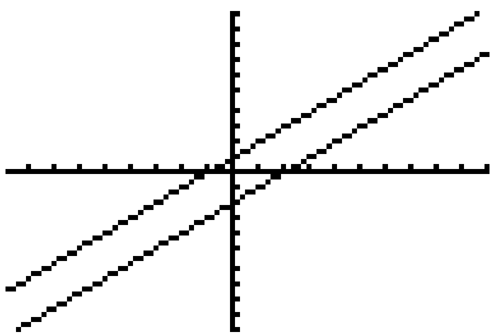
Notes

C. y_2 is below y_1 on the coordinate plane; the lines are parallel.



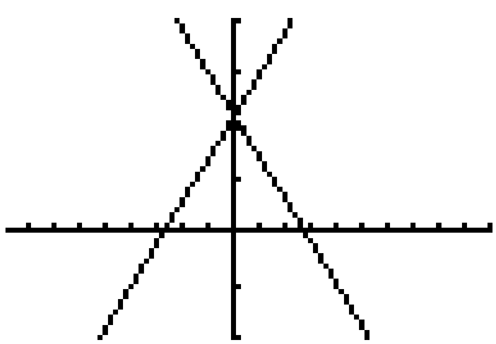
D. The lines are parallel; the new line is above the original on the coordinate plane.

E. The x-intercept for y_2 is 3 units to the left of the x-intercept for y_1. The lines are parallel.



F. The lines are parallel; the x-intercept for new lines is 2.5 units to the right of the x-intercept for the original line.

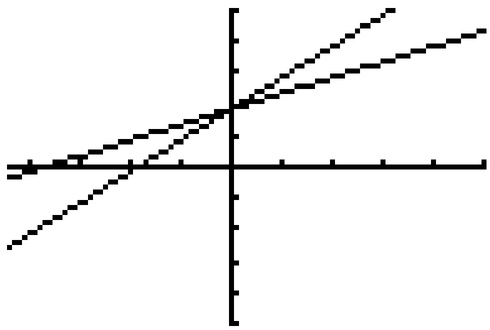
G. y_1 is increasing while y_2 is decreasing; y_1 increases at the same rate y_2 decreases; share a common y-intercept.



Notes

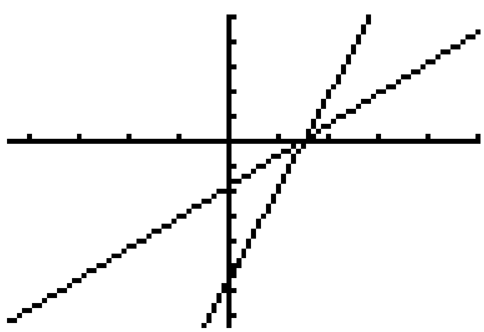
H. One line is increasing while the other is decreasing; one line increases at the same rate the other decreases; share a common y-intercept.

I. y_2 has a greater slope (twice as steep); share the same y-intercept.



J. The new line has a greater slope (3.1 times as steep); share the same y-intercept.

K. y_2 has a greater slope (three times as steep); the two lines share a common x-intercept.



L. The new line has a greater slope (1.66 times as steep); the two lines share a common x-intercept.

M. The y-intercept will increase (move up the y-axis).

Notes

N. The y-intercept will increase (move up the y-axis); slope will increase negatively; the x-intercept is negative; the x-intercept does not change.

O. The number of VCRs grows slower in the 1989-94 period.

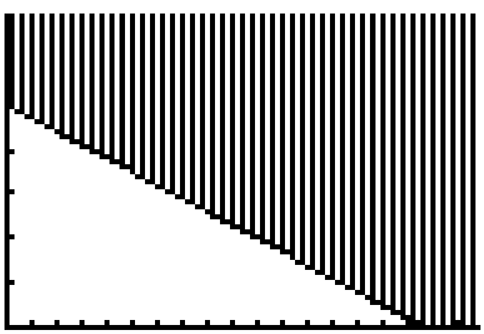
P. **y = 1.95x + 10.75**; United Gameware; $6.50; use the point (5, 27) and the slope, -0.85, to create the new equation, **y = -0.85x + 31.25**.

3.08

A. **E = 1.20x – 99.89** (**x = 90** for 1990). Average annual growth (slope) is $1.20 billion per year. Reach $21 billion in 2001.
No exports prior to 1983 (really??).

B. 205 Kwh

C. **3FG + PAT ≥ 50**.



D. 1, 3, or 5 three-point field goals could be scored.

E. 87 games; 71% (5/7 of the remaining games)

Notes

3.09

A. $8.40

B. $3.54

C. 300 sweatshirts and 900 t-shirts

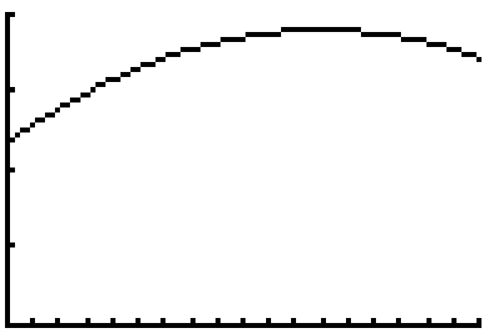
D. 98 adult tickets

E. When $m \leq 33$, Matthews has the better rate.

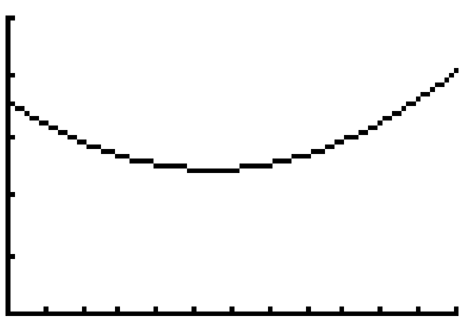
F. By the beginning of 1996 the NC rate was better.

3.10

A. Prices peaked in the 12th month. The price will return to the $1.179 price 24 months later.

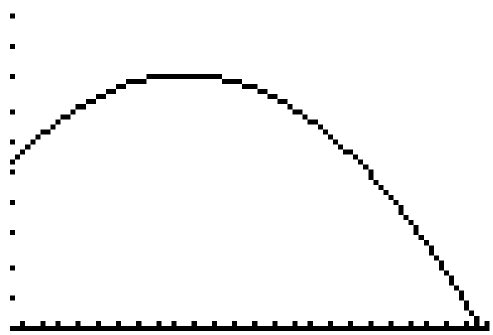


B. The low price was $12.25 in the fifth month. The high price was $20.50 in the twelfth month. In the 17th month the stock will first double its price ($38.03)

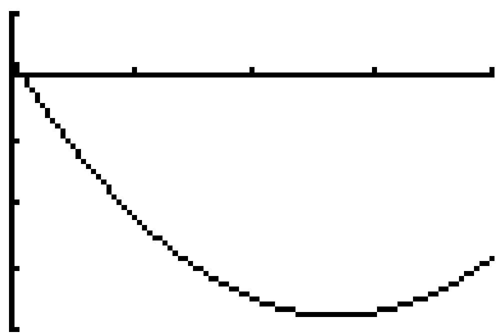


Notes

C. The SRBs splashdown at least six minutes after launch; the last 20,000 feet of descent are by parachute. The SRBs continue to gain altitude for 89 seconds after separation from the main vehicle.



D. According to the algebraic model, the trade balance is approximately zero early in 1994 and during 1999.

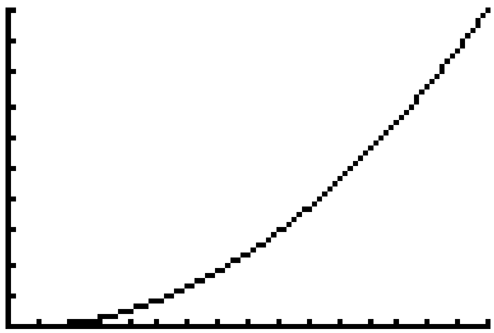


Notes

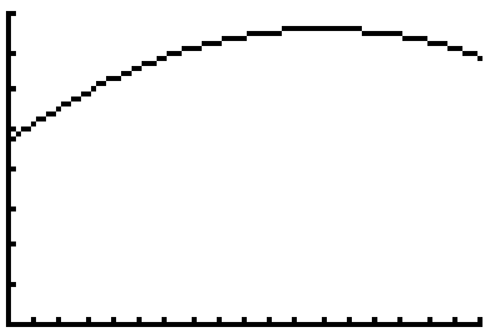
3.11

Notes

A. One million cell phones in 1987; 100.6 million cell phones in 2001.



B. Prices were above $1.50 for 12 months.



C. $-\frac{3}{7}$, 17

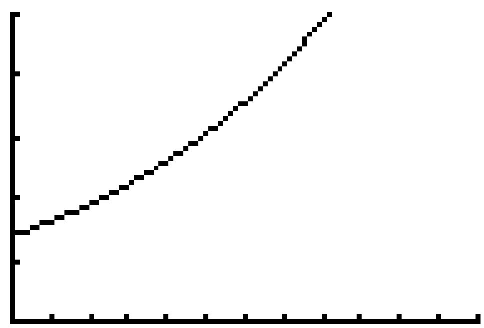
D. $\frac{5}{3}$, -3

3.12

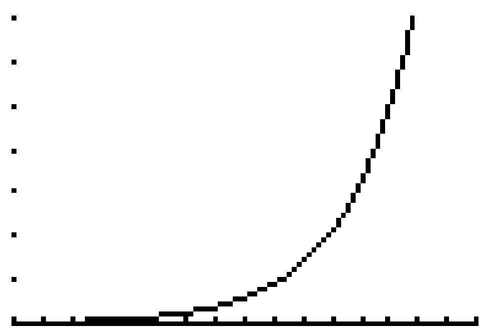
Notes

A. Remember 23 phrases after three weeks; remember four phrases after one year.

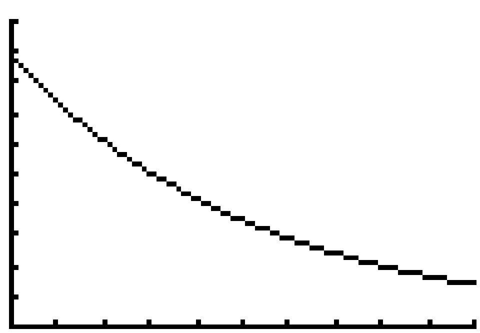
B. It takes approximately seven months for her to triple her money; 15 months to reach $150.



C. 178 million



D. Half value after four years; the car is worth $2746.34 after 10 years.



4.01

Notes

A. The currencies are decreasing in value with respect to the US dollar. The Swedish krona shows the greatest change; the British pound the least. Several currencies fluctuated (up and down) over the 11 weeks.

B. As weight increases, calories used increases; as the speed increases, calories used
increases. George uses approximately 11.5 calories per minute. Amy uses approximately 5.5 calories per minute.

C. For four of the five countries the trade balance is increased negatively, although the change wasn't very pronounced for Canada. Japan was relatively un-changed.

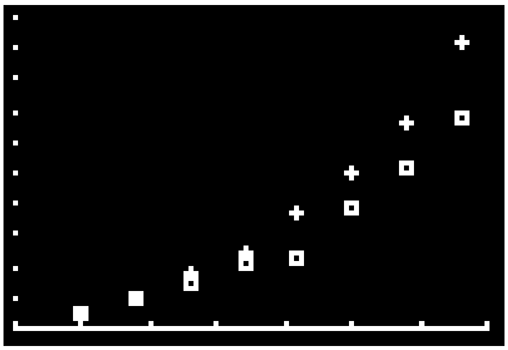
D. Both of these matrices are in the coordinates-by-vertices arrangement. Vertices-by-coordinates arrangements areequally acceptable.

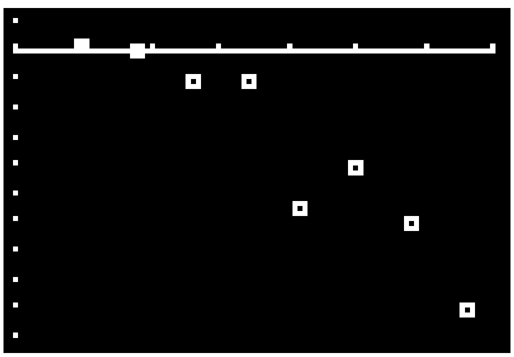
$$\begin{bmatrix} 2 & 8 & 3 \\ 9 & 6 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 10 & 12 & 18 & 16 \\ 7 & 10 & 8 & 5 \end{bmatrix}$$

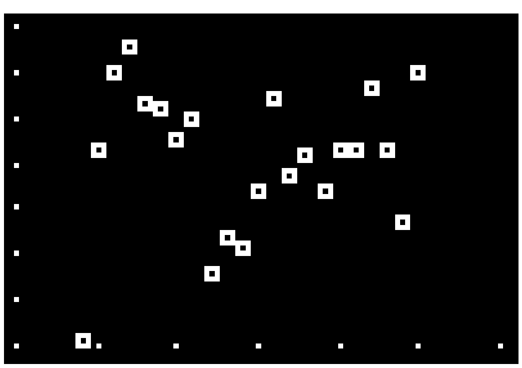
4.02

A. Exports and imports have increased over the years; the balance has generally increased negatively.





B. Too much variation for a good model. Refinery capacity and political situations in the various petroleum producing countries are two variables that affect the price of petroleum.



Notes

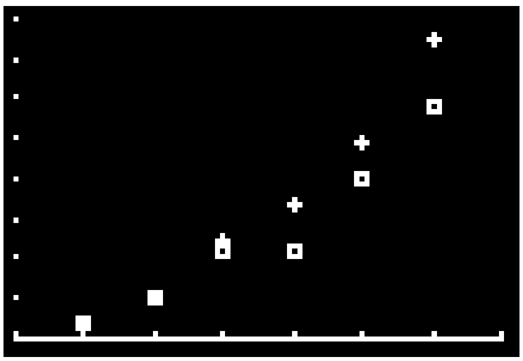
4.03

Notes

A. **R = 0.034m + 2.314**; (42, 3.84), (54, 4.27), (72, 4.93), (84, 5.36)

B. (**x = 70** for 1970)
exports: **E = 20.29x - 1411**;

imports: **I = 27.41x - 1935**
According to the models, trade was balanced in 1974. Imports are growing $7.12 billion per year faster than exports. According to the models, imports will not double exports any time soon.



C. Initial analysis should be based on the graph; scoring margin correlates best with wins (0.82).

D. **P = 0.008x - 0.481** (**x = 58** for 1958); $0.38 for 2005.

E. **P = 0.4324x - 3.1456** (**x = 35** for 1935): percent spent is increasing 0.43 percentage points per year (slope). Less time and desire for preparing meals at home are possible variables affecting the percentage. According to the model, 2023 will be the first year Americans spend more away from home.