Math 111 Name:_____

FINAL EXAM REVIEW & KEY

Final Exam Study Suggestions
The final exam will have 40 multiple-choice questions. You will be allowed to use your calculator on the entire exam. To help you thoroughly study for the final exam, the mathematics department has prepared this review packet. The review contains 40 open-response questions (A) and 40 multiple choice questions (B). After working all the open-response questions, use the multiple-choice questions as a practice test. Set aside one hour and 50 minutes of time, and complete the multiple choice questions without using your notes, text, or a tutor. Use the answer key to check your work and pay close attention to the questions you get wrong. Additional practice on the concepts giving you difficulty is suggested. Refer to your notes or text for additional practice problems. Seek help from your instructor or a tutor.

Additional study tips are:

- Always check your answers!
- Complete the Math 111 Review in time to get help from the LAC and/or your instructor. Do not wait until the day before the Final Exam.
- Know when your final is scheduled:
  - Day and Date _____
  - Time _____
  - Room _____
- Bring sharpened #2 pencils with erasers, a Scantron F-1712-PAR-L, a calculator, and your Schoolcraft ID number.

The following formulas will be provided for you on the final exam:

$A = P(1 + rt)$

$A = P\left(1 + \frac{r}{n}\right)^{nt}$

$P = \frac{A}{\left(1+\frac{r}{n}\right)^{nt}}$

$PMT = \frac{P\left(\frac{r}{n}\right)}{1-\left(1+\frac{r}{n}\right)^{-nt}}$

$C = 2\pi r$

$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$

$A = \pi r^2$

$ME = \frac{1}{\sqrt{n}} \times 100\%$

$FV = \frac{d\left((1+\frac{r}{n})^{nt}-1\right)}{\left(\frac{r}{n}\right)}$

1A. A straight road down a steep hill is 2000 ft long. By the time you get to the bottom of the hill, you are 100 ft below your starting position. Determine the horizontal distance you have traveled from your starting position. (Round your answer to the nearest foot.)

1B. To get from her home to Grandma's house, Red Riding Hood drove due north 120 miles, then turned left and drove due west an additional 40 miles. How far, as the crow flies, is Red's house from Grandma's house? (Round your answer to the nearest mile.)

A) 80 miles

B) 113 miles

C) 126 miles

D) 160 miles

2A. Jenny Poole bought a bedroom suite for \$4600 at Richard's Furniture. She made a \$1200 down payment and financed the balance at the store over a two year period at 12% interest. What will Jenny's monthly payment be?

2B. Joe purchased a new computer for $1800. He paid it off by making monthly payments for 3 years at 6% interest. What was the monthly payment?

A) $50.00

B) $54.76

C) $59.00

D) $673.40

3A. The enrollment of Rodgers Junior College can be found by using the equation $y = 275x+8000$, where x is the number of years since 2010. Find the enrollment in 2020.

3B. Sam drives a delivery van. The equation $C = 0.5m + 60$ models the relation between his weekly cost, C, in dollars and the number of miles, m, that he drives. Find the cost for a week when he drives 250 miles.

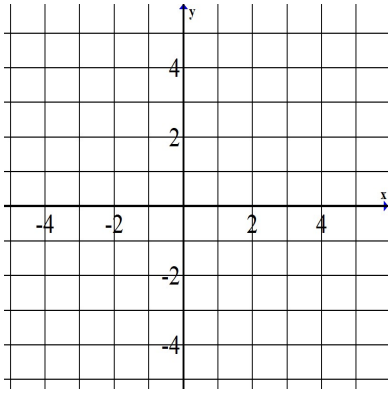
A) $155

B) $1310

C) $185

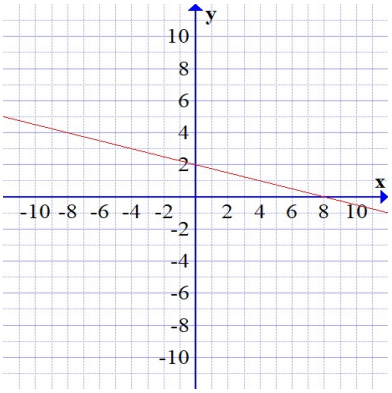
D) $72.50

4A. Graph $4x - 2y = 0$.

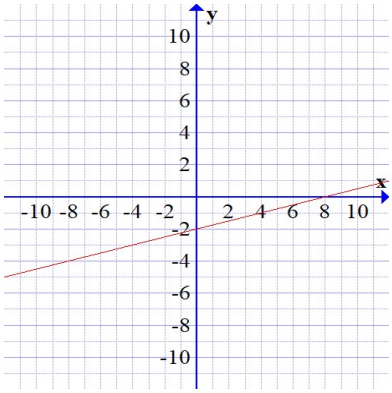


4B. Identify the graph of $x + 4y = 8$.

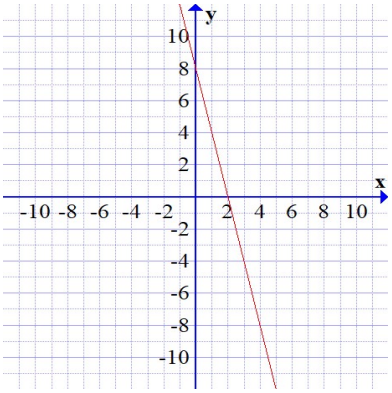
A)



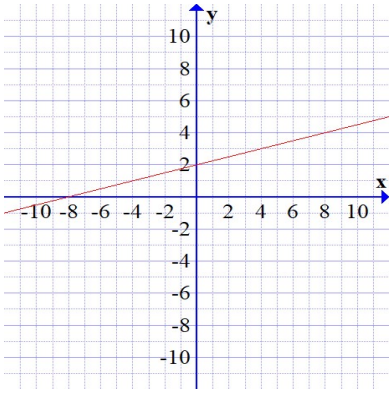
C)



B)



D)



5A. The enrollment of Rodgers Junior College can be found by using the linear equation $y = 275x + 8000$, where x is the number of years since 2010. Identify the slope and the y-intercept, then explain what each one represents in the context of this problem. Your explanation should include appropriate units.

5B. A salesman earns a fixed monthly salary plus a 3.5% on all sales. The linear function $y = 0.035x + 2000$ describes his total monthly earnings, y, in dollars, as a function of monthly sales, x, in dollars. What does the y-intercept represent?

A) The amount of his commision

B) His commission rate

C) His fixed monthly salary

D) His total monthly sales

6A. Solve the system:

$$x + 4y = 11$$
$$2x - 3y = 0$$

6B. Solve the system and state the y-value of the solution.

$y = 3x$
$2x - y = 5$

A) $y = 5$

B) $y = 15$

C) $y = -5$

D) $y = -15$

7A. A small manufacturing plant produces two kinds of bicycles—single speed and ten speed. The plant can manufacture up to 400 of the single speed bicycles and up to 500 of the ten speed bicycles per month, but it can only manufacture a total 650 of both kinds every month. It takes 40 man-hours to manufacture a single speed bicycle and 80 man-hours for the ten speed; there are 44,000 man-hours available per month. The profit on a single speed bicycle is \$20 and the profit on a ten speed bicycle is \$30. Let z represent the total monthly profit from the manufacture and sale of x single speed and y ten speed bicycles. If the plant wishes to maximize its total monthly profit, write an equation for the objective function.

7B. Two kinds of crated cargo, A and B, are to be shipped by truck. Each crate of cargo A is 50 cubic feet in volume and weighs 200 pounds, whereas each crate of cargo B is 10 cubic feet in volume and weighs 360 pounds. The shipping company charges \$75 per crate for cargo A and \$100 per crate for cargo B. The truck has a maximum load limit of 7200 pounds and 1000 cubic feet. Let z represent the total charges from shipping x crates of cargo A and y crates of cargo B. If the shipping company wishes to maximize the total shipping charges, write an equation for the objective function.

A) $z = x + y$

B) $z = 75x + 100y$

C) $z = 7200x + 1000y$

D) $z = 100x + 75y$

8A. A small manufacturing plant produces two kinds of bicycles—single speed and ten speed. The plant can manufacture up to 400 of the single speed bicycles and up to 500 of the ten speed bicycles per month, but it can only manufacture a total 650 of both kinds every month. It takes 40 man-hours to manufacture a single speed bicycle and 80 man-hours for the ten speed; there are 44,000 man-hours available per month. The profit on a single speed bicycle is \$20 and the profit on a ten speed bicycle is \$30. Let z represent the total monthly profit from the manufacture and sale of x single speed and y ten speed bicycles. Write a system of inequalities which represent the constraints for this problem.

8B. Two kinds of crated cargo, A and B, are to be shipped by truck. Each crate of cargo A is 50 cubic feet in volume and weighs 200 pounds, whereas each crate of cargo B is 10 cubic feet in volume and weighs 360 pounds. The shipping company charges \$75 per crate for cargo A and \$100 per crate for cargo B. The truck has a maximum load limit of 7200 pounds and 1000 cubic feet. Let z represent the total charges from shipping x crates of cargo A and y crates of cargo B. Which of the following represents the constraints for this problem?

A) $\begin{cases} 50x + 10y \geq 7200 \\ 200x + 360y \geq 1000 \\ x \geq 0, y \geq 0 \end{cases}$

B) $\begin{cases} 50x + 10y \leq 1000 \\ 200x + 360y \leq 7200 \\ x \geq 0, y \geq 0 \end{cases}$

C) $\begin{cases} 50x + 10y \leq 7200 \\ 200x + 360y \leq 1000 \\ x \leq 0, y \leq 0 \end{cases}$

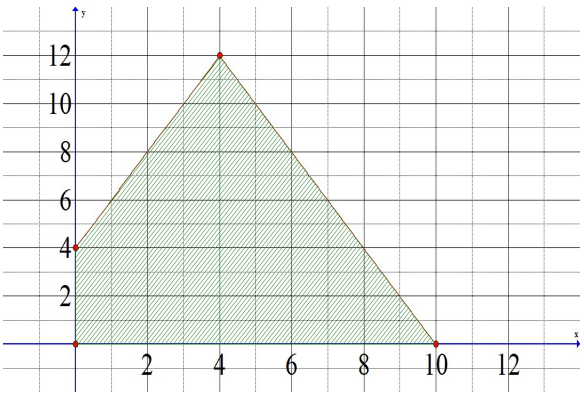
D) $\begin{cases} 50x + 10y \geq 1000 \\ 200x + 360y \geq 7200 \\ x \leq 0, y \leq 0 \end{cases}$

9A. Help the manufacturing plant from problems 7A and 8A to determine how many single speed bikes x and ten speed bikes y they should produce to maximize monthly profit by solving the following optimization problem:

Maximize $z = 20x + 30y$ subject to the constraints $\begin{cases} 0 \le x \le 400 \\ 0 \le y \le 500 \\ x + y \le 650 \\ 40x + 80y \le 44000 \end{cases}$

The graphs of $x = 400$, $y = 500$, $x + y = 650$, and $40x + 80y = 44000$ are given below:

9B. What is the maximum value of the objective function $z = 50x - 10y$ in the feasible set pictured below?



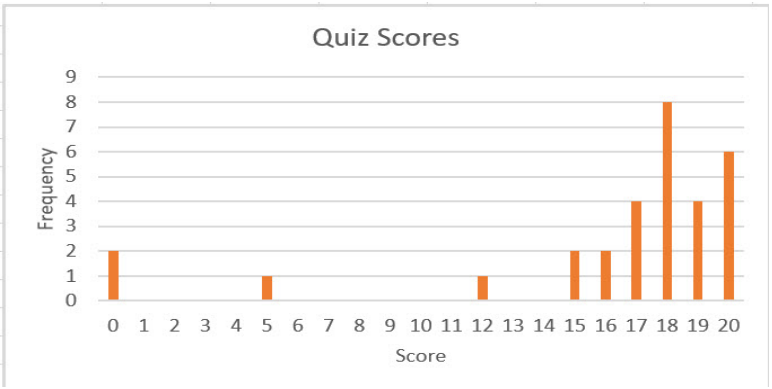
A) 80

B) 400

C) 500

D) 560

10A. A teacher records scores on a 20-point quiz for the 30 students in his class. The results are summarized below. How many students scored less than 50% on the quiz?



10B. Using the data from 10A, what was the most frequent score on the quiz?

A) 8

B) 18

C) 20

D) 5

11A. A set of fine china that lists for $345.70 is on sale at 55% off. The sales tax rate is 6%. Find the final cost of the china, including sales tax.

11B. To the nearest percent, calculate the percent discount on a bag of M&M's that normally retails for \$2.89, but is on sale this week for \$2.19.

A) 24%

B) 32%

C) 68%

D) 76%

12A. On April 12, Ruth Odom borrowed \$5000 from her credit union. On July 1, she repaid the loan for \$5100. Determine the loan's simple interest rate, r. Use 1 year = 360 days.

12B. Determine the time, t, in months if \$33,750 is loaned at 8.4% simple interest and the future value of the loan at maturity is \$36,112.50.

A) 5/6 month

B) 10 months

C) 25 months

D) 300 months

13A. While rummaging through the attic, you discover a savings account left to you by your rich Uncle David. When you were 5 years old, he invested $20,000 in your name, at 5% interest compounded semiannually. If you are now 20 years old, how much is the account worth?

13B. To save for retirement, a woman invests $10,000 at 6% interest compounded monthly. What will the investment be worth after four years?

A) $10,000.00

B) $12,400.00

C) $12,624.77

D) $12,704.89

14A. Bob and Joy Salkind want to save $50,000 in 5 1/2 years for home improvement projects. If the Bank of Aventura is paying 8% interest compounded quarterly, how much must they deposit now to have the money for their home improvements?

14B. If you can get an interest rate of 3% compounded monthly, how much must you set aside now to have $100,000 in ten years?

A) $74,109.56

B) $74,409.39

C) $100,000.00

D) $134,935.35

15A. The price of a home is $125,000. The bank requires a 20% down payment at the time of closing. The remainder will be financed with a fixed-rate mortgage at 5.75% for 30 years. Find the total interest paid over the life of the loan.

15B. The price of a home is $290,000. The bank requires a 20% down payment at the time of closing. The remainder is financed with a 25 year fixed-rate mortgage at 6.5%. The monthly payment is $1566. Find the total cost of interest over 25 years.

A) $179,800

B) $237,800

C) $355,250

D) $374,216

16A. A credit card charges interest using the average daily balance method, and has a monthly rate of 1.61%. The itemized billing for the month of April is shown below:

Date	Activity	Amount	Balance
April 1	Unpaid balance		$1,125.00
April 9	Purchase	$47.90	$1,172.90
April 14	Payment	(-$300.00)	$872.90
April 19	Purchase	$85.75	$958.65
April 20	Purchase	$13.00	$971.65
April 29	Purchase	$60.30	$1,031.95
April 30	Ending Balance		$1,031.95

i Find the Average Daily Balance.

ii Find the interest charged for the month of April.

iii Find the total balance owed on the last day of the billing period.

16B. A credit card has a monthly rate of 1.8% and uses the average daily balance method for calculating interest. The itemized billing for the month of April is shown below:

Detail	Date	Amount
Unpaid Balance	April 1	$1115
Charge	April 3	$755
Charge	April 11	$275
Charge	April 15	$815
Payment	April 28	(-$1040)
Last Day of billing period	April 30	
Payment due date	May 9	

The average daily balance is $2333.67. Find the amount owed at the end of the billing period.

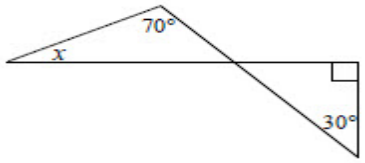
A) $42.01

B) $2375.68

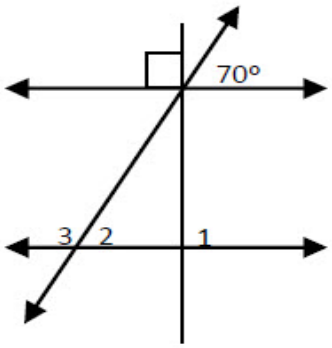
C) $1962.01

D) $1920

17A. Find the measure of $\angle x$



17B. Find the measure of $\angle 3$. You may assume that lines that appear to be parallel *are* parallel.



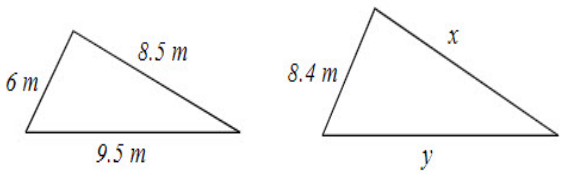
A) 20°

B) 70°

C) 90°

D) 110°

18A. The triangles pictured below are similar. Find the length of the side labeled x.



18B. A tree casts a shadow of 12 feet long. At the same time, a lamp post 8 feet high casts a shadow that is 6 feet long. How tall is the tree?

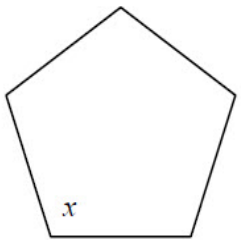
A) 9 ft

B) 12 ft

C) 14 ft

D) 16 ft

19A. The figure shows a regular polygon. Find the measure of angle x.



19B. Find the measure of one angle in a regular hexagon.

A) 90°

B) 120°

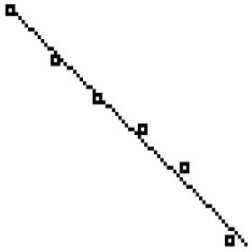
C) 135°

D) 180°

20A. Find the correlation coefficient of the following set of data. Based on the critical value of 0.878, is there significant correlation between x and y?

x-value	y-value
1	1
2	0.5
3	2.5
4	5.2
5	5.3

20B. Identify the correlation coefficient for the given data and regression line.



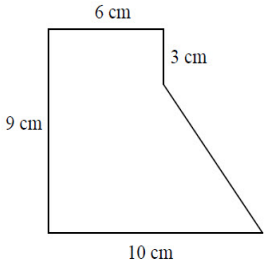
A) -0.99

B) -0.09

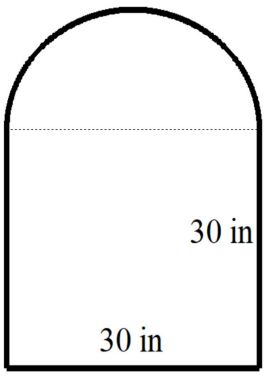
C) 0.09

D) 0.99

21A. Find the area of the following figure.



21B. Find the area of the figure, rounded to the nearest square inch.



A) 137 in^2

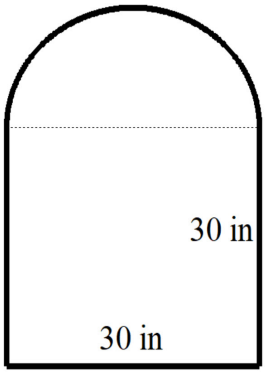
B) 900 in^2

C) 1253 in^2

D) 2314 in^2

22A. How many inches of lace are required to trim a round tablecloth that is 54 inches in diameter? Round your answer to the nearest inch.

22B. Find the perimeter of the figure, rounded to the nearest square inch.



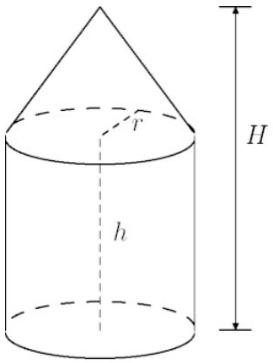
A) 60 in

B) 137 in

C) 167 in

D) 184 in

23A. Find the volume of the figure if $r = 6$ in, $h = 11$ in, and $H = 14$ in.



23B. A cylindrical can of spaghetti sauce has a diameter of 8.5 cm and a height of 14.5 cm. Find the volume of the can to the nearest cubic centimeter.

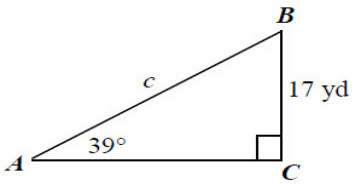
A) 123 cm^3

B) 823 cm^3

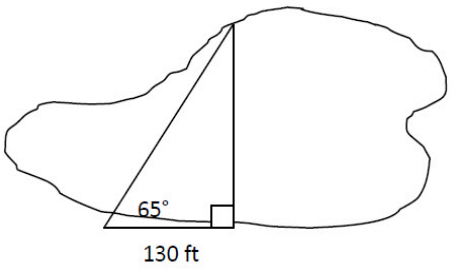
C) 1404 cm^3

D) 3291 cm^3

24A. Find the length of side c. Round your answer to the nearest whole number



24B. To find the distance d across a large pond, a surveyor took measurements as shown in the figure. To the nearest foot, what is the distance across the pond?



A) 61 ft

B) 118 ft

C) 191 ft

D) 279 ft

25A. Jamie wants to select 4 songs for a playlist. She can choose from 12 rock selections, 10 hip hop selections, 7 country selections, and 5 classical selections. If Jamie chooses one selection from each category, how many ways can she choose her playlist?

25B. You are taking a multiple-choice test that has 9 questions. Each of the questions has 3 choices, with one correct choice per question. Assuming you leave nothing blank, how many ways can you answer the questions?

A) 27

B) 84

C) 729

D) 19,683

26A. A math club has twenty members, and it must choose four officers: president, vice-president, secretary, and treasurer. Assuming that each office is to be held by one person and no person can hold more than one office, in how many ways can the four positions be filled?

26B. Suppose you are asked to list, in order of preference, the three best movies you have seen this year. If you saw 10 movies during the year, in how many ways can the three best be chosen and ranked?

A) 10

B) 30

C) 120

D) 720

27A. Five out of a batch of 20 computers will be selected and tested for defects. How many ways are there to make this selection?

27B. To win a state lottery, one must correctly select 6 numbers from a pool of 48 numbers (1-48). The order in which the selection is made does not matter. How many different selections are possible?

A) 288

B) 10,737,573

C) 12,271,512

D) 8,835,488,640

28A. The table shows the number of minority officers in the U.S. military in 2020. Assume that one person will be randomly selected from the group. Find the probability of selecting an officer who is in the Navy, given that the officer is African American.

	Army	Navy	Marines	Air Force
African American	9162	3524	1341	4282
Hispanic American	2105	2732	914	1518
Other Minorities	4075	2653	599	3823

28B. Numbered disks are placed in a box and one disk is selected at random. If there are 2 red disks numbered 1 through 2, 3 blue disks numbered 3 through 5, and 5 green disks numbered 6 though 10, find the probability of selecting a blue disk, given that an odd-numbered disk is selected.

A) $\frac{1}{2}$

B) $\frac{2}{3}$

C) $\frac{3}{10}$

D) $\frac{2}{5}$

29A. One card is randomly selected from a deck of 52 cards. Find the odds against selecting a queen.

29B. The odds in favor of a candidate winning an election are given at 3 to 1. What is the probability that this candidate will win the election?

A) $\frac{1}{3}$

B) $\frac{2}{3}$

C) $\frac{1}{4}$

D) $\frac{3}{4}$

30A. In a casino game, the player rolls a pair of dice. If the first throw is a 7 or an 11, the player wins automatically. What is the probability that the player will win on the first throw?

30B. In 2020, the stock market took big swings up and down. A survey of 997 investors asked how often they tracked their portfolio. The table shows the investor responses. What is the probability that an investor tracked their portfolio daily or weekly?

How frequently?	Response
Daily	226
Weekly	270
Monthly	289
Quarterly	145
Never	67

A) $\frac{226}{997}$

B) $\frac{226}{270}$

C) $\frac{270}{997}$

D) $\frac{496}{997}$

31A. A psychology quiz has ten true or false questions. If you haven't studied for the quiz and simply guess the answer to each question, what is the probability that you will have a perfect score on the quiz?

31B. You are dealt one card from a 52 card deck. Then the card is replaced, the deck is shuffled, and you draw again. Find the probability of drawing a face card (jack, queen, or king) the first time and a spade the second time.

A) $\frac{3}{52}$

B) $\frac{1}{4}$

C) $\frac{3}{13}$

D) $\frac{25}{52}$

32A. A TV repair service sells maintenance agreements for \$10 per year. The average cost to the service to repair a television is \$36, and in any given year, 4 out of every 100 people who purchase maintenance agreements will require repairs on their televisions. Find the service's expected profit per maintenance agreement.

32B. A game is played by selecting one bill at random from a bag that contains ten \$1 bills, five \$2 bills, three \$5 bills, one \$10 bill, and one \$100 bill. The player gets to keep the selected bill. There is a \$20 charge to play the game. What is the expected value for the player?

A) -\$12.75

B) -\$7.25

C) \$12.25

D) \$7.25

33A. You draw two cards from a full deck. What is the probability that both cards are face cards?

33B. A box contains five red balls, six green balls, and nine yellow balls. Suppose you select two balls from the box. Find the probability that both balls are red.

A) $\frac{1}{19}$

B) $\frac{1}{16}$

C) $\frac{1}{4}$

D) $\frac{35}{76}$

34A. Suppose you are interested in whether or not the students at your college would favor a grading system in which students receive letter grades (e.g. A+, A, A-, B+, B, B-, ...) instead of numerical grades (e.g. 4.0, 3.9, 3.8, ...). Describe how you might obtain a random sample to survey 100 students from the entire student population.

34B. The city council of a large city needs to know whether its residents will support the building of three new schools. The council decides to conduct a survey of a sample of the city's residents. Which procedure would be most appropriate for obtaining a sample of the city's residents?

A) Survey a random sample of teachers who live in the city.

B) Survey 100 individuals who are randomly selected from a list of all people living in the state in which the city in question is located.

C) Survey a random sample of persons within each neighborhood of the city.

D) Survey every tenth person who enters City Hall on a randomly selected day.

35A. The ages of the full-time faculty in a college mathematics department are: 29,38,40,43,46,51,53,56,58,58,60, and 62. Construct a stem-and-leaf plot for this data. Then determine the mean, median, and mode.

35B. The stem-and-leaf plot below displays the scores of 40 students on a statistics exam. Determine the median score.

Stems	Leaves
4	357
5	046779
6	346678
7	13455666789
8	001224478
9	23444

A) 72.675

B) 74

C) 75.5

D) 76 and 94

36A. Determine the range of the scores in 35B.

36B. The ages of the last nine presidents at inauguration are given below. Determine the standard deviation, rounded to the nearest hundredth.

President	Age
Ford	61
Carter	52
Reagan	69
G.H.W. Bush	64
Clinton	46
G.W. Bush	54
Obama	47
Trump	70
Biden	78

A) 9.11

B) 10.47

C) 11.11

D) 60.11

37A. The mean cholesterol level for all men in the United States is 200 and the standard deviation is 15. Assuming a normal distribution, use the 68-95-99.7 rule to find the percentage of U.S. men whose cholesterol level is above 230.

37B. The ages of students at a certain college are normally distributed with a mean of 21 and a standard deviation of 2. Use the 68-95-99.7 rule to find the percentage of students aged 21-27.

A) 47.5%

B) 49.85%

C) 95%

D) 99.7%

38A. Using a random sample of 2297 American adults, an NBC Today Show poll asked respondents if they got enough sleep at night. 47% indicated that they did not get enough sleep at night. Find the margin of error, to the nearest tenth of a percent, for this survey. Then complete the following statement:

We can be _____% confident that between _____% and _____% of American adults feel that they do not get enough sleep at night.

38B. A survey was conducted using a random sample of 120 students from a campus of approximately 12,000 students. 60% of the students in the sample said they were very satisfied with their professors. Find the margin of error for this study.

A) $\pm 0.9\%$

B) $\pm 12.9\%$

C) $\pm 9.1\%$

D) $\pm 0.8\%$

39A. The following table gives data relating to a car's gas mileage to its weight. Find the equation of the regression line and the correlation coefficient. Round all values to 3 decimal places.

Weight (lb) x	2100	2200	2400	2500	2800	3000	3200
Mileage (mpg) y	37	34	29	27	26	25	23

39B. Some researchers believe that there is a correlation between animal fat consumption by premenopausal women and the incidence of breast cancer. The following table gives the average daily intake of animal fat and age-adjusted death rate from breast cancer. Find the equation for the regression line.

Daily fat intake in grams x	20	40	90	100	120
Death rate per 100,000 y	3	7	17	19	23

A) $y = 0.2x - 1$

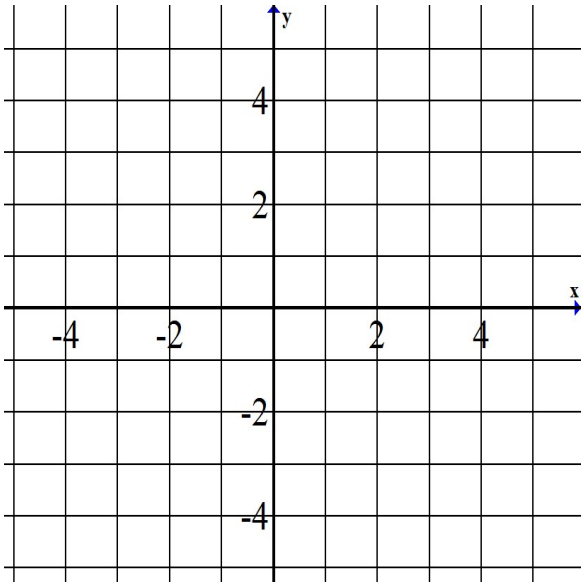
B) $y = -x + 0.2$

C) $y = -0.2x + 1$

D) $y = x - 0.2$

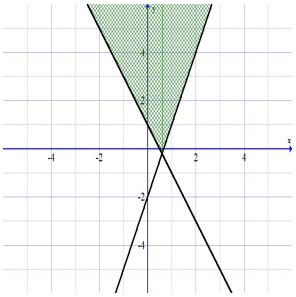
40A. Graph the solution set to the system of inequalities.

$$\begin{cases} y < 2x + 3 \\ y + 1 \geq -\frac{1}{2}x \end{cases}$$

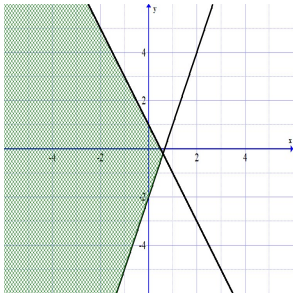


40B. Identify the solution set for the following system of linear inequalities. $\begin{cases} y \geq 3x - 2 \\ 2x + y \leq 1 \end{cases}$

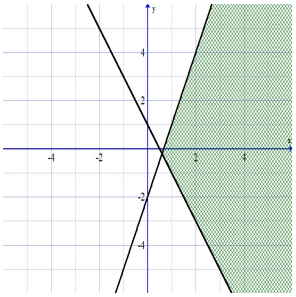
A)



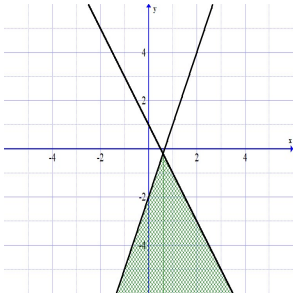
C)



B)



D)



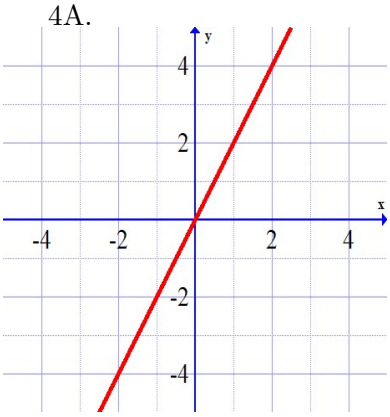
Answer Key:

1A. 1997 ft
1B. C

2A. $160.05
2B. B

3A. 10,750
3B. C

4A.



4B. A

5A. slope=275 (enrollment is increasing at a rate of 275 students per year), y-intercept=(0,8000) (enrollment in 2010 was 8000 students).
5B. C

6A. (3,2)
6B. D

7A. $z = 20x + 30y$
7B. B

8A. $\begin{cases} 0 \le x \le 400 \\ 0 \le y \le 500 \\ x + y \le 650 \\ 40x + 80y \le 44000 \end{cases}$
8B. B

9A. 200 single speed bikes and 450 ten speed bikes
9B. C

10A. 3
10B. B

11A. $164.90
11B. A

12A. 9%
12B. B

13A. $41,951.35
13B. D

14A. $32,341.95
14B. A

15A. $110,085.20
15B. B

16A. ADB=$1033.21, Interest=$16.63, Balance=$1048.58
16B. C

17A. 50°
17B. D

18A. 11.9 m
18B. D

19A. 108°
19B. B

20A. $r = 0.927$, yes there is significant correlation
20B. A

21A. 66 cm^2
21B. C

22A. 170 in
22B. B

23A. 1357.17 in^3

23B. B

24A. 27 yd
24B. D

25A. 4200
25B. D

26A. 116,280
26B. D

27A. 15,504
27B. C

28A. $\frac{3524}{18309}$
28B. D

29A. 12:1
29B. D

30A. $\frac{2}{9}$
30B. D

31A. $\frac{1}{1024}$
31B. A

32A. \$8.56
32B. A

33A. $\frac{11}{121}$
33B. A

34A. Obtain a list of student numbers of currently enrolled students from registration and randomly select 100 of them. Must make sure each student is equally likely to be selected.
34B. C

35A.

Stem	Leaf
2	9
3	8
4	036
5	13688
6	02

mean=49.5, median=52, mode=58
35B. C

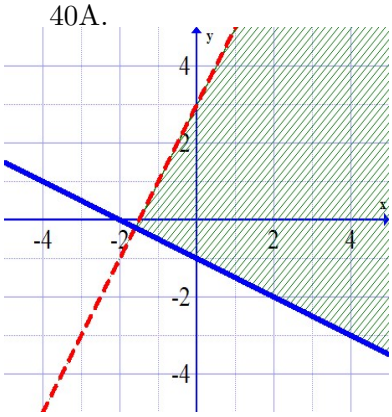
36A. 51
36B. C

37A. 2.5%
37B. B

38A. margin of error = $\pm 2.1\%$. We can be 95% confident that between 44.9% and 49.1% of American adults feel that they do not get enough sleep at night.
38B. C

39A. $y = -0.011x + 58.283$, $r = -0.927$
39B. A

40A.



40B. C