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Applications of
Mathematics 12

JUNE 2001

Course Code = AMA

Student Instructions

1. Place the stickers with your Personal Education Number (PEN) in the allotted spaces above. **Under no circumstance is your name or identification, other than your Personal Education Number, to appear on this booklet.**
2. Ensure that in addition to this examination booklet, you have an **Examination Response Form**. Follow the directions on the front of the Response Form.
3. **Disqualification** from the examination will result if you bring books, paper, notes or unauthorized electronic devices into the examination room.
4. When instructed to open this booklet, **check the numbering of the pages** to ensure that they are numbered in sequence from page one to the last page, which is identified by **END OF EXAMINATION**.
5. At the end of the examination, place your Response Form inside the front cover of this booklet and return the booklet and your Response Form to the supervisor.

Question 1a:

1. .

(2)

Question 5b:

9. .

(1)

Question 1b:

2. .

(1)

Question 6:

10. .

(6)

Question 1c:

3. .

(2)

Question 7a:

11. .

(3)

Question 2a:

4. .

(3)

Question 7b:

12. .

(3)

Question 2b:

5. .

(3)

Question 7c:

13. .

(3)

Question 3:

6. .

(6)

Question 7d:

14. .

(5)

Question 4:

7. .

(6)

Question 7e:

15. .

(2)

Question 5a:

8. .

(5)

Question 7f:

16. .

(4)

**APPLICATIONS OF
MATHEMATICS 12**

JUNE 2001

COURSE CODE = AMA

GENERAL INSTRUCTIONS

1. Aside from an approved calculator, electronic devices, including dictionaries and pagers, are **not** permitted in the examination room.
2. All multiple-choice answers must be entered on the Response Form using an **HB pencil**. Multiple-choice answers entered in this examination booklet will **not** be marked.
3. For each of the written-response questions, write your answer in the space provided in this booklet.

You will not be provided with any additional paper since rough-work space for the written-response questions has been incorporated into the space allowed for answering each question. You may not need all of the space provided to answer each question.

4. Ensure that you use language and content appropriate to the purpose and audience of this examination. Failure to comply may result in your paper being awarded a zero.
5. This examination is designed to be completed in **two hours**. *Students may, however, take up to 30 minutes of additional time to finish.*

APPLICATIONS OF MATHEMATICS 12 PROVINCIAL EXAMINATION

- | | Value | Suggested Time |
|---|---------------|--------------------|
| 1. This examination consists of three parts: | | |
| PART A: 30 multiple-choice questions | 45 | 45 |
| PART B: 6 written-response questions | 35 | 45 |
| PART C: Case Study | 20 | 30 |
| | Total: | 100 marks |
| | | 120 minutes |
2. The last **three** pages inside the back cover contain **Formulae**, **Table of Z-scores**, **Rough Work for Graphing**, and **Rough Work for Multiple-Choice**. These pages may be detached for convenient reference prior to writing this examination.
3. **A graphing calculator is essential for the Applications of Mathematics 12 Provincial Examination.** The calculator must be a hand-held device designed primarily for mathematical computations involving logarithmic and trigonometric functions, for graphing functions and for performing statistical tests. Computers, calculators with a QWERTY keyboard or symbolic manipulation abilities; such as the Computer Algebraic System (CAS) and electronic writing pads will not be allowed. Students must not bring any external devices (peripherals) to support calculators such as manuals, printed or electronic cards, printers, memory expansion chips or cards, CD-ROMs, libraries or external keyboards. Students may have more than one calculator available during the examination, of which one may be a scientific calculator. Calculators may not be shared and must not have the ability to either transmit or receive electronic signals. In addition to an approved calculator, students will be allowed to use rulers, compasses, and protractors during the examination.
- Calculators must not have any information programmed into the memory which would not be acceptable in paper form. Specifically, calculators must not have any built-in notes, definitions, or libraries. There is no requirement to clear memories at the beginning of the examination but the use of calculators with built-in notes is equivalent to the use of notes in paper form. Any student deemed to have cheated on a provincial examination will receive a “0” on that examination and will be permanently disqualified from the Provincial Examination Scholarship Program.
4. If, in a justification, you refer to information produced by the calculator, this information must be presented clearly in the response. For example, if a graph is used in the solution of the problem, it is important to sketch the graph, showing its general shape and indicating the appropriate window dimensions.
5. When using the calculator, you should provide a decimal answer that is correct to **at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

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PART A: MULTIPLE CHOICE

Value: 45 marks

Suggested Time: 45 minutes

INSTRUCTIONS: For each question, select the **best** answer and record your choice on the Response Form provided. Using an HB pencil, completely fill in the circle that has the letter corresponding to your answer.

1. Given the matrices $Q_{2 \times 3}$ and $R_{3 \times 2}$, what are the dimensions of the product matrix QR ?

- A. 2×2
- B. 2×3
- C. 3×2
- D. 3×3

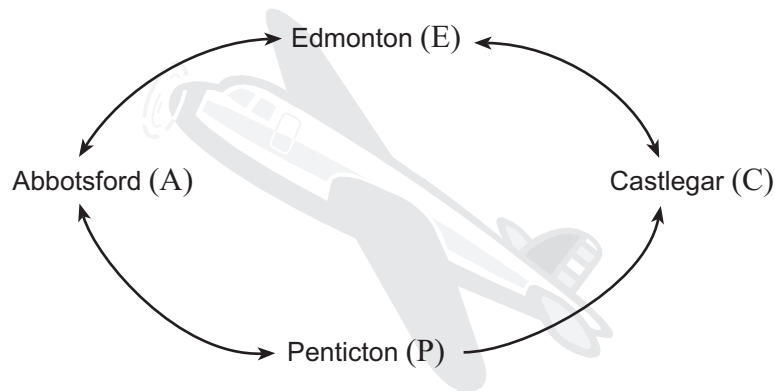
2. Determine the value of p for the matrix equation below.

$$2 \begin{bmatrix} 3 & 5 \\ -2 & 1 \end{bmatrix} - 3 \begin{bmatrix} -2 & 4 \\ 1 & 7 \end{bmatrix} = \begin{bmatrix} p & q \\ r & s \end{bmatrix}$$

- A. 0
- B. 1
- C. 5
- D. 12

OVER

3. An airline has connecting flights between four cities as shown below.



Which flight matrix below represents these connecting flights?

A.

		To			
		A	P	C	E
From	A	0	1	0	1
	P	1	0	1	0
	C	0	0	0	1
	E	1	0	1	0

B.

		To			
		A	P	C	E
From	A	0	1	0	1
	P	1	0	0	0
	C	0	1	0	0
	E	1	0	1	0

C.

		To			
		A	P	C	E
From	A	0	1	0	1
	P	1	0	1	0
	C	0	1	0	1
	E	1	0	1	0

D.

		To			
		A	P	C	E
From	A	1	1	0	1
	P	1	1	1	0
	C	0	0	1	1
	E	1	0	0	1

4. Solve the following system for x :

$$3x - y + 2z = 9$$

$$x - 3z = -1$$

$$2y - z = -3$$

- A. -2
- B. -1
- C. 1
- D. 2

5. If matrix $A = [x \ y]$ with $x + y = 1$ and matrix $T = \begin{bmatrix} \frac{1}{4} & \frac{3}{4} \\ \frac{2}{3} & \frac{1}{3} \end{bmatrix}$, determine the value of y so that $AT = A$.

- A. $\frac{1}{2}$
- B. $\frac{9}{17}$
- C. $\frac{2}{3}$
- D. $\frac{9}{8}$

6. The formula “= SUM (A1 . .D1) / 6” is entered into cell A5 of the spreadsheet below.

	A	B	C	D
1	15	20	122	65
2	14	54	12	27
3	0	21	30	46
4	25	32	45	6
5				
6				

What will be the contents of cell A5?

- A. 9
- B. 24
- C. 37
- D. 89

7. An investor has \$100 000 to invest in either Plan A or Plan B. If the money is invested for a 10-year period, which of the plans would yield a better return, and by how much? (Accurate to the nearest dollar.)

Plan A: 6% per annum, compounded monthly

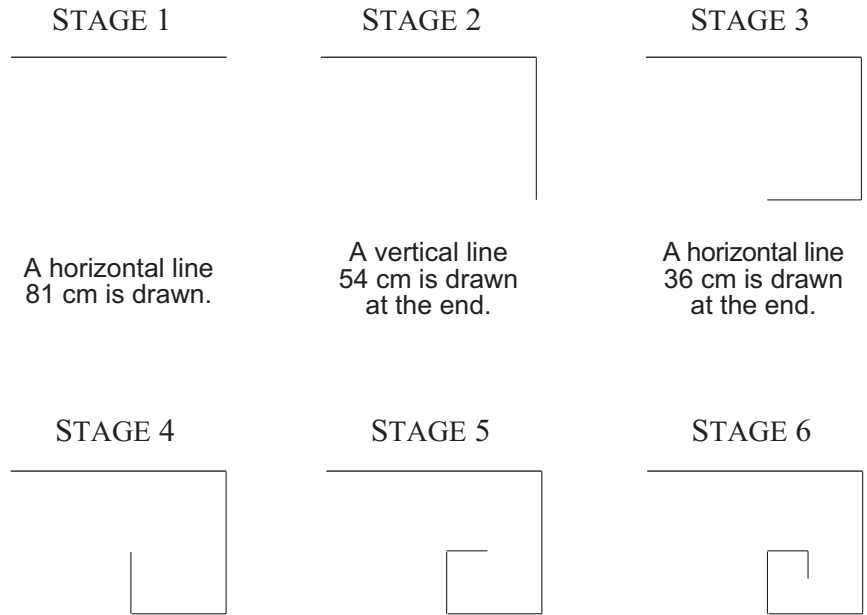
Plan B: $6\frac{1}{8}\%$ per annum, compounded annually

- A. Plan A by \$732
- B. Plan A by \$2 123
- C. Plan B by \$732
- D. Plan B by \$2 123

8. A set of three cube-shaped plastic tubs, decreasing in size, fit inside each other. The volume of the largest tub is $125\,000\text{ cm}^3$. The edge length of each tub decreases to $\frac{3}{4}$ of the previous edge length. What is the volume of the smallest tub to the nearest cm^3 ?

- A. 17 813
- B. 22 247
- C. 39 550
- D. 70 313

Use the following diagrams to answer questions 9 and 10.



The process continues with each additional segment being $\frac{2}{3}$ the length of the previous segment.

9. What is the total length of the line segments at Stage 6?

- A. $\frac{665}{3}$
- B. $\frac{697}{3}$
- C. $\frac{2\,027}{9}$
- D. $\frac{2\,059}{9}$

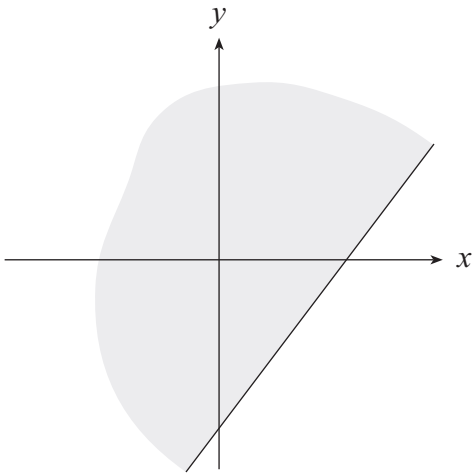
10. If this process continues without end, what is the total length of the line segments?

- A. $\frac{243}{5}$
- B. $\frac{243}{2}$
- C. 243
- D. infinite

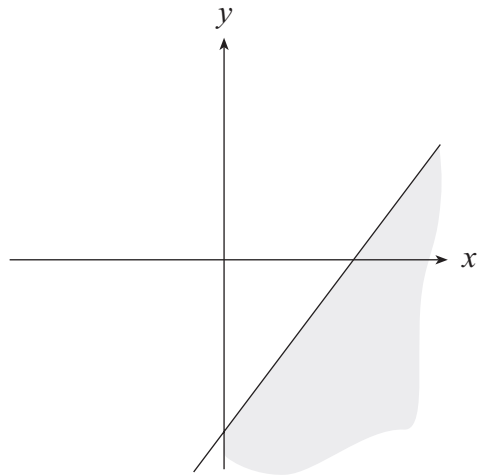
OVER

11. Which graph best represents the solution of the inequality $4x - 3y > 12$?

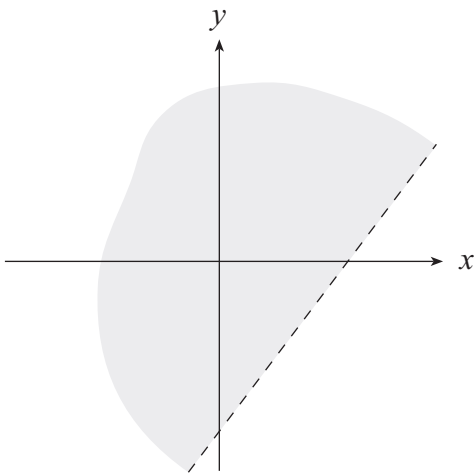
A.



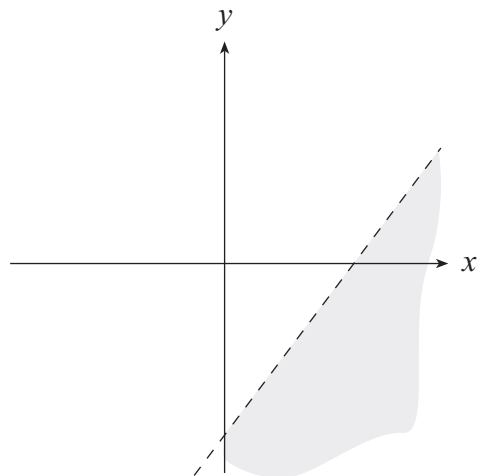
B.



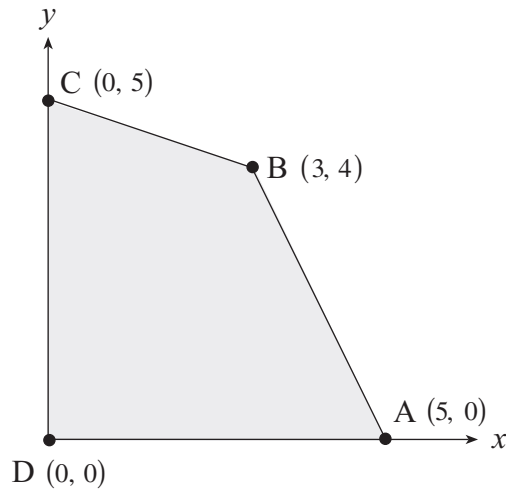
C.



D.



12. The graph below shows the feasible region for a linear programming problem, with corner points A(5, 0), B(3, 4), C(0, 5), D(0, 0).



The objective function is $P = ax + by$ where $a > 0$ and $b > 0$. For what condition on a and b will the maximum value of P occur at both A and B?

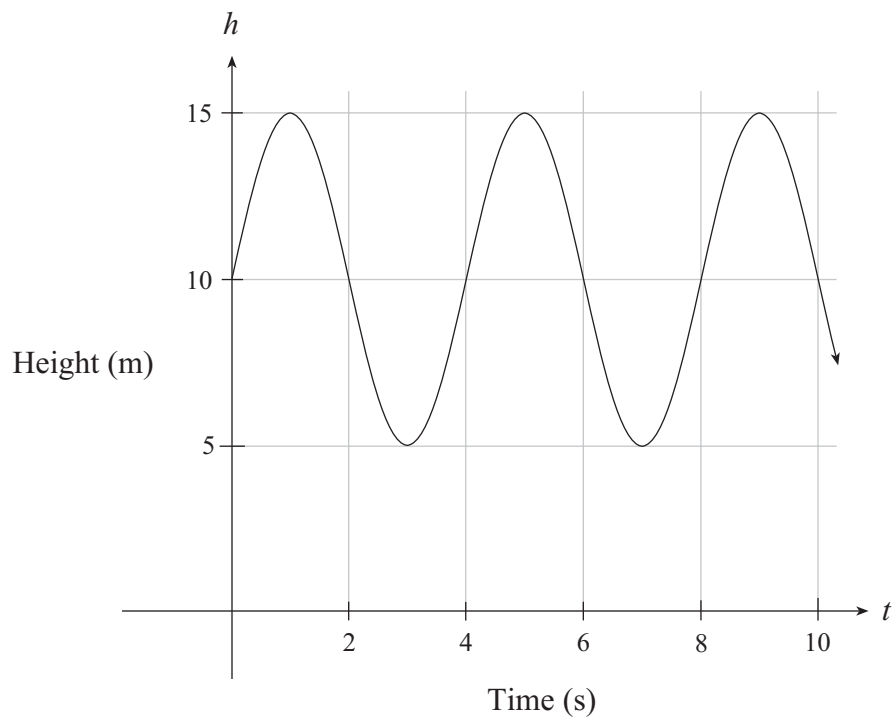
- A. $a > 2b$
 - B. $b > 3a$
 - C. $a = 2b$
 - D. $b = 3a$
13. What type of function is $f(x) = \frac{3}{x+4}$?
- A. power
 - B. reciprocal
 - C. polynomial
 - D. exponential
14. Determine the y-intercept of the graph of $y = \log(x + 12) - 3$.
- A. -3
 - B. -2
 - C. -1.92
 - D. 0.95

OVER

15. What is the minimum value of y if $y = -4 \cos(3x) + 7$?

- A. -4
- B. -3
- C. 3
- D. 7

16. The graph below shows the height, h , in metres, of the tip of one paddle of a windmill at time, t , in seconds.

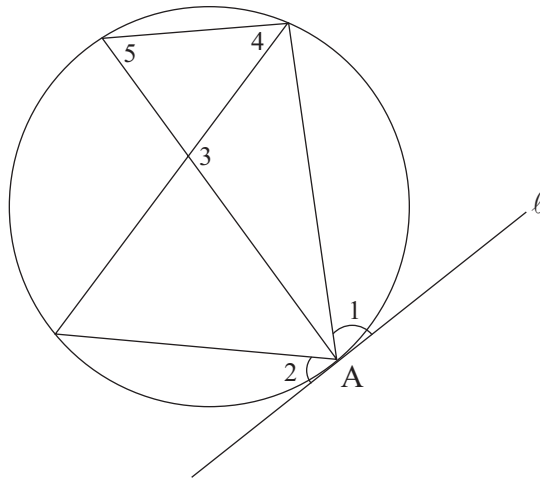


How many rotations does the paddle make in 3 **hours**?

- A. 1 800
- B. 2 700
- C. 3 600
- D. 7 200

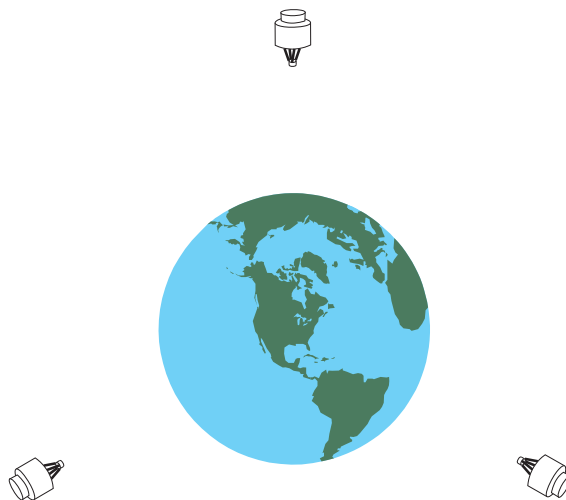
17. The population of trout in a certain lake varies sinusoidally with time. The population was at a maximum of 28 000 trout on June 1, 1995 and reached its next minimum of 16 000 trout on June 1, 1999. Determine the expected population on June 1, 2006 to the nearest thousand trout.
- A. 18 000
 - B. 19 000
 - C. 23 000
 - D. 24 000

18. If line ℓ is tangent to the circle at A, which angle **must** be equal to $\angle 1$?



- A. 2
- B. 3
- C. 4
- D. 5

19. A country wants to position three satellites in order to communicate with all parts of the earth. What is the minimum distance in km from the centre of the earth that these satellites should be located? (Assume the radius of the earth is 6 400 km.)



- A. $6\,400\sqrt{2}$
B. $6\,400\sqrt{3}$
C. 12 800
D. 19 200
20. Which correlation coefficient, r , shows the strongest relationship between two variables?
- A. -0.9
B. -0.3
C. 0.2
D. 0.8
21. Which one of the points, $P(-3, -2)$, $Q(-2, 0.5)$, $R(0, 5.5)$, or $S(3, 3)$, lies exactly on the least squares line of best fit for the data?
- A. P
B. Q
C. R
D. S

22. In a normal distribution, what percentage of the population have z -scores greater than zero?

- A. 50%
- B. 68%
- C. 75%
- D. 100%

23. The volume of the contents of a soft drink can is normally distributed with a mean of 356 mL and a standard deviation of 1.4 mL. Calculate the z -score for a can containing 354 mL.

- A. -1.60
- B. -1.43
- C. 1.43
- D. 1.60

24. Quiz results for thirty students are recorded in the frequency table shown below. Determine the mean score for this quiz.

Score	Frequency
0	3
1	6
2	8
3	7
4	4
5	2

- A. 2
- B. 2.3
- C. 2.5
- D. 3

25. An insurance company analyzed its claims per policy as summarized in the table below.

Annual Claim Amount (\$)	Probability
0	0.95
1 000	0.04
5 000	0.006
10 000	0.003
20 000	0.001

What is the expected amount of money that will be paid out per policy in a year?

- A. \$45
- B. \$60
- C. \$105
- D. \$120

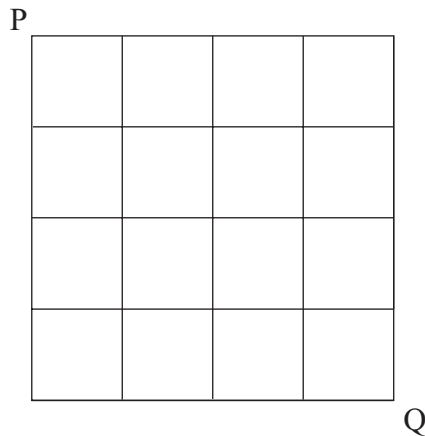
26. On a standardized achievement test, the mean score is 74.6 with a standard deviation of 11.3. If a random sample of 81 tests is selected, determine a 90% confidence interval for the mean score of these tests.

- A. $67.1 < \mu < 82.1$
- B. $71.7 < \mu < 77.5$
- C. $72.1 < \mu < 77.1$
- D. $72.5 < \mu < 76.7$

27. What is the probability that a three-digit telephone extension number has one or more repeated digits (assuming no digit is more likely than another to be used)?

- A. 0.20
- B. 0.28
- C. 0.30
- D. 0.33

28. How many different paths are there from P to Q on a 4×4 square if only moves to the right and downward are allowed?



- A. 16
B. 32
C. 64
D. 70
29. A cylindrical tank with no top has radius 50 cm and height 200 cm. It is filled with water to a height of 100 cm. If a solid cube of metal 30 cm on each edge is lowered to the bottom of the cylinder, how much will the height of the water rise?
- A. 0.34 cm
B. 1.72 cm
C. 3.44 cm
D. 13.75 cm
30. AB is a chord of a circle with centre O. Point P is located on chord AB such that $AP = 21$, $BP = 9$ and $OP = 10$. Determine the radius of the circle.
- A. 11
B. 15
C. 17
D. 19

**This is the end of the multiple-choice section.
Answer the remaining questions directly in this examination booklet.**

OVER

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PART B: WRITTEN RESPONSE

Value: 35 marks

Suggested Time: 45 minutes

INSTRUCTIONS: Rough-work space has been incorporated into the space allowed for answering each question. You may not need all the space provided to answer each question. Where required, place the final answer for each question in the space provided.

If, in a justification, you refer to information produced by the calculator, this information must be presented clearly in the response. For example, if a graph is used in the solution of the problem, it is important to sketch the graph, showing its general shape and indicating the appropriate window dimensions.

When using the calculator, you should provide a decimal answer that is correct to **at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

Full marks will NOT be given for the final answer only.

1. The table below shows the scores for five students on a mathematics exam consisting of a non-calculator and a calculator section. Each section of the exam is scored out of 100.

Student	Non-Calculator Section Score	Calculator Section Score
A	75	86
B	60	54
C	83	91
D	65	64
E	87	95

- a) Determine an equation for a least squares regression line for this data. **(2 marks)**

ANSWER:

b) Determine the correlation coefficient.

(1 mark)

ANSWER:

c) Use the regression equation from part a) to predict the score a student could expect to receive on the non-calculator section if he scores 78 on the calculator section. **(2 marks)**

ANSWER:

OVER

2. A cafe opens its outdoor patio only on days that it does not rain. From past records it was found that when it rained one day, the probability that it would rain the next day was 0.40. When it did not rain one day, the probability of rain the next day was 0.06.

a) If it rains on Thursday, what is the probability that it will not rain on the following Sunday?
(3 marks)

ANSWER:

b) Over the long term, what percentage of days is the patio expected to be open? **(3 marks)**

ANSWER:

OVER

3. Over an 18-hour period, the temperature, T , of a chemical reaction is given by the function $T = 100(2)^{\frac{x}{3}} - x^3$, where x represents the number of hours since the reaction began.

For how many **minutes** was the temperature below zero?

(6 marks)

If providing a graphical solution, state the function(s) used, sketch the graph, indicate appropriate window dimensions and clearly explain how your solution is derived from the graph.



$Y_1 =$

$Y_2 =$

$Y_3 =$

$Y_4 =$

[,] [,]

x
min x
max

y
min y
max

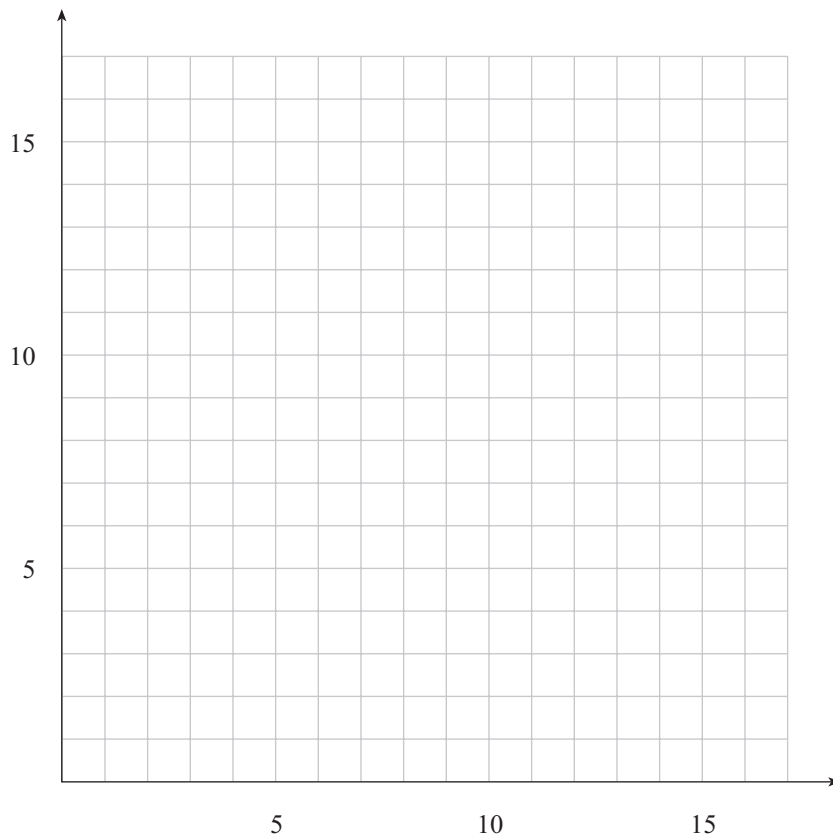
ANSWER:

OVER

4. A manufacturing company has an order for 6 000 boxes of stove bolts and 3 200 boxes of lag screws. Two of its factories produce both bolts and screws at the same time. Details of each factory's operations are shown in the table below. **(6 marks)**

	Stove Bolts (boxes per day)	Lag Screws (boxes per day)	Factory Operating Costs Per Day
Factory A	600	400	\$1 500
Factory B	1 000	400	\$2 000

List the constraints and the objective function, then solve the linear programming problem to determine the number of days each factory should be used to minimize the cost to fill the order.



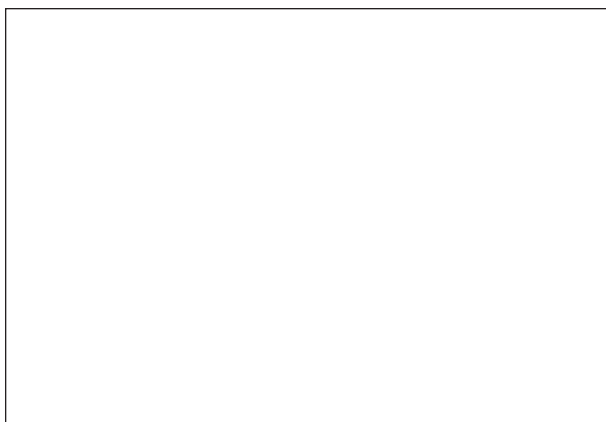
ANSWER:

OVER

5. A car rental company can rent out all of its 100 cars in one day if it charges \$30 per day for each car. For each \$2 increase in price, the number of rentals decreases by 5. The average cost of maintenance for each car rented is \$10 per day.

a) What should the car rental company charge per day to maximize profits? **(5 marks)**

If providing a graphical solution, state the function(s) used, sketch the graph, indicate appropriate window dimensions and clearly explain how your solution is derived from the graph.



$Y_1 =$

$Y_2 =$

$Y_3 =$

$Y_4 =$

[,] [,]

x
min max

y
min max

ANSWER:

b) What will be the maximum profit in one day?

(1 mark)

ANSWER:

OVER

6. A multiple-choice test has 50 questions. For students who have prepared for the test, the probability that they will answer any question correctly is 0.75. A student who correctly answers 35 to 39 questions (inclusive) will receive a grade of B. What percentage of students who have prepared for the test will receive a grade of B? **(6 marks)**

ANSWER:

OVER

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PART C: CASE STUDY

Value: 20 marks

Suggested Time: 30 minutes

INSTRUCTIONS: Rough-work space has been incorporated into the space allowed for answering each question. You may not need all the space provided to answer each question. Where required, place the final answer for each question in the space provided.

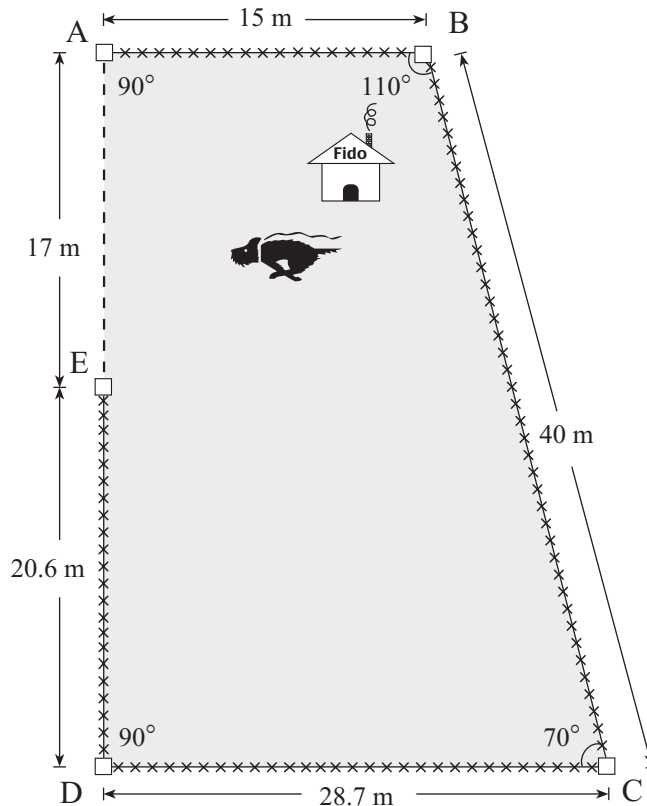
If, in a justification, you refer to information produced by the calculator, this information must be presented clearly in the response. For example, if a graph is used in the solution of the problem, it is important to sketch the graph, showing its general shape and indicating the appropriate window dimensions.

When using the calculator, you should provide a decimal answer that is correct to **at least two decimal places** (unless otherwise indicated). Such rounding should occur **only** in the final step of the solution.

Full marks will NOT be given for the final answer only.

7. An owner of a corner lot is going to fence and seed his backyard. The perimeter of the backyard is shown with dimensions and angles provided. The fence is to be built along the perimeter shown by $\times\times\times\times$. The 17 m section from A to E shown by $---$ is unfenced.

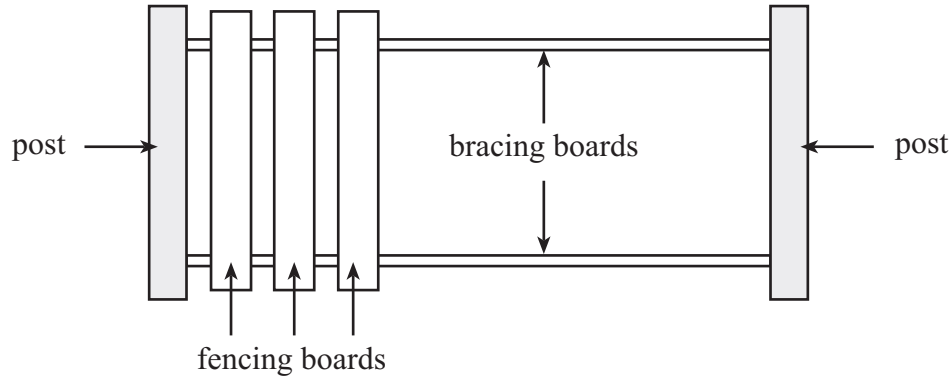
- Posts are already in place at locations A, B, C, D, and E, and are shown in the diagram as \square .
- Ignore the width of the posts in your calculations.
- All costs given in this problem include appropriate taxes.



- a) More posts need to be placed along the perimeter to support the fence to be built. If there is to be no more than 3 m between posts, and the cost of each post is \$3.75, determine the minimum cost for the posts. (Ignore the width of the posts in your calculations.) **(3 marks)**

ANSWER:

Use the following diagram to answer questions 7b) and c).



- b) Between each post, 2 horizontal bracing boards are attached, onto which the fencing boards are nailed, as shown in the diagram.

The bracing boards are bought in 3-metre lengths and cut to fit between each post. Each 3-metre bracing board costs \$2.25. Determine the cost of all the bracing boards needed to build the fence. **(3 marks)**

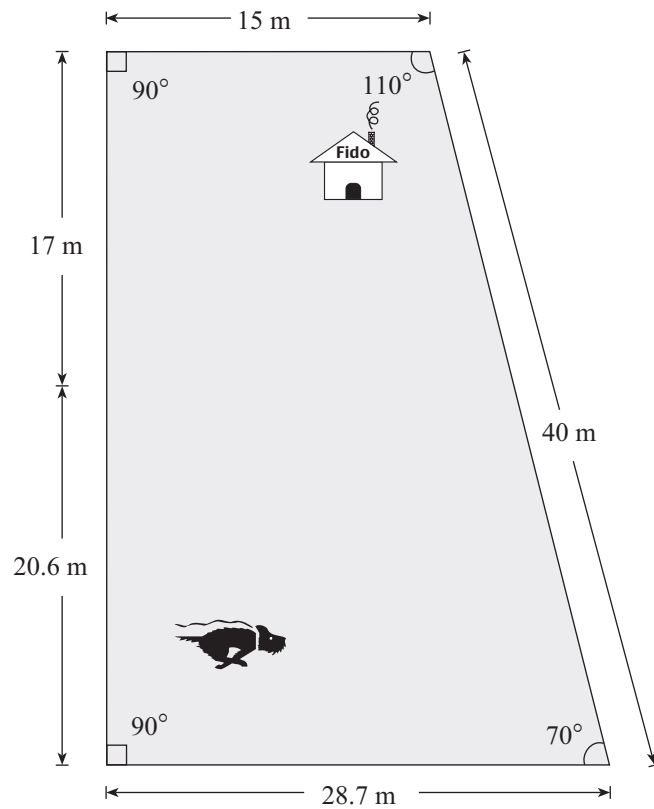
ANSWER:

- c) Fencing boards are nailed to the bracing boards. The fencing boards are approximately 15 cm wide and cost \$1.10 per board. A 10 cm space is left between adjacent fencing boards. Determine the cost of all the fencing boards needed to build the fence. **(3 marks)**

ANSWER:

OVER

Use the following diagram to answer question 7d).



- d) Determine the area of the backyard and then determine the cost of seeding the backyard if it costs approximately \$15 per 100 m^2 for seed and fertilizer. **(5 marks)**

ANSWER:

- e) If the owner does the work himself instead of paying a company \$2 000 to do the entire job (labour and materials for fencing and seeding), approximately how much money is saved? **(2 marks)**

ANSWER:

- f) What factors should the owner consider when determining either to do the work himself or to hire a company? Are there other expenses that the owner may have if he does the work himself? **(4 marks)**

END OF EXAMINATION

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FORMULAE

Geometry:

Triangle: Area = $\frac{1}{2}bh$
 = $\frac{1}{2}ab \sin C$
 = $\frac{1}{2} \frac{a^2 \sin B \sin C}{\sin A}$
 = $\sqrt{s(s-a)(s-b)(s-c)}$
 where $s = \frac{a+b+c}{2}$

Circle: $A = \pi r^2, C = 2\pi r = \pi d$

Sphere: $A = 4\pi r^2, V = \frac{4}{3}\pi r^3$

Cylinder: $A = 2\pi r^2 + 2\pi rh, V = \pi r^2 h$

Cone: $A = \pi rs + \pi r^2, V = \frac{1}{3}\pi r^2 h$

Volume of pyramid: $V = \frac{1}{3}A_b h$

Volume of prism: $V = A_b h$

Interest:

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

$$I = Prt$$

Miscellaneous:

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$S_\infty = \frac{a}{1-r}$$

Probability and Statistics:

$${}_n P_r = P(n, r) = \frac{n!}{(n-r)!}$$

$${}_n C_r = C(n, r) = \binom{n}{r} = \frac{n!}{r!(n-r)!}$$

$$\bar{x} = \frac{1}{n} \sum (f_i)(x_i)$$

$$\sigma = \sqrt{\frac{1}{n} \sum (x_i - \bar{x})^2} = \sqrt{\frac{1}{n} \sum x_i^2 - \bar{x}^2}$$

$$\mu = np$$

$$\sigma = \sqrt{npq}$$

$$b(n, r; p) = \binom{n}{r} p^r q^{n-r}$$

$$z = \frac{x - \mu}{\sigma}$$

$$\bar{x} - z_{\alpha/2} \frac{\sigma}{\sqrt{n}} < \mu < \bar{x} + z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$E(x) = x_1 p_1 + x_2 p_2 + \dots + x_n p_n$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$r = \frac{n \sum xy - (\sum x)(\sum y)}{\left(\sqrt{n(\sum x^2) - (\sum x)^2}\right) \left(\sqrt{n(\sum y^2) - (\sum y)^2}\right)}$$

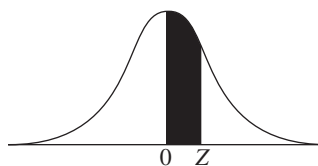
Note: Graphing calculators will contain many of these formulae as pre-programmed functions.

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TABLE OF Z-SCORES

Z = Z-Score

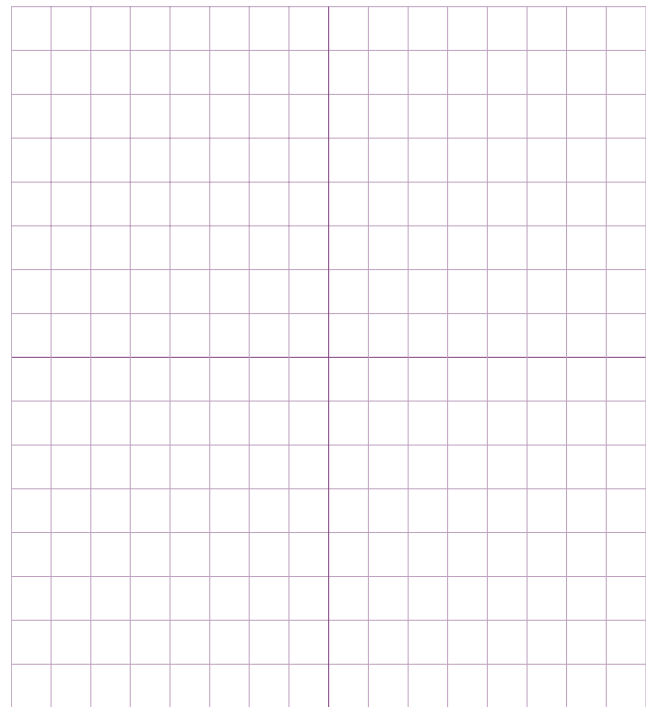
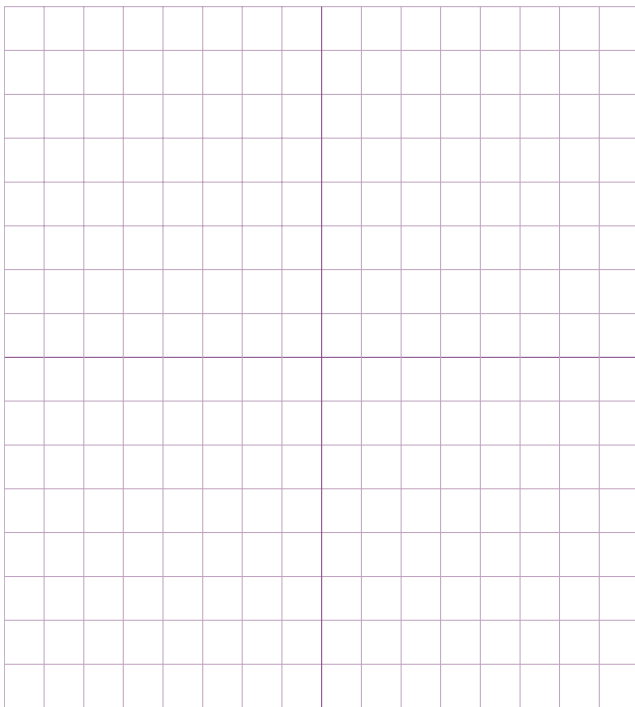
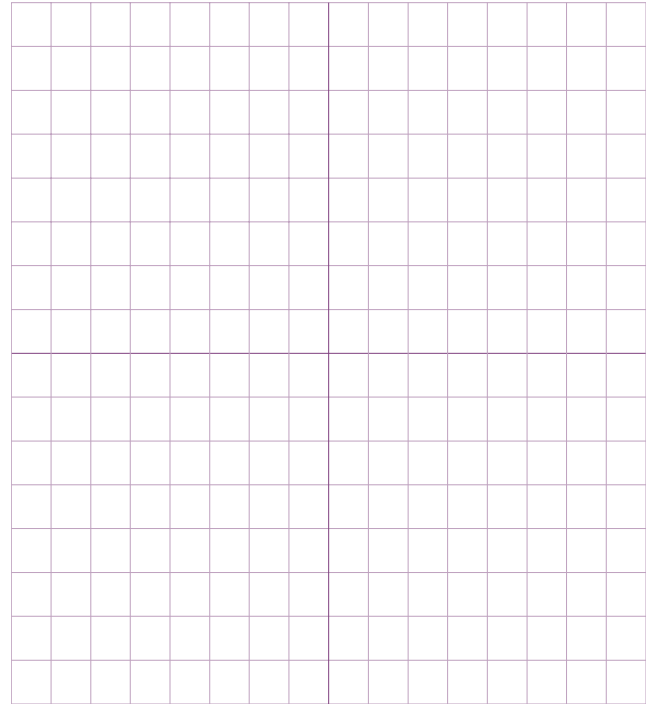
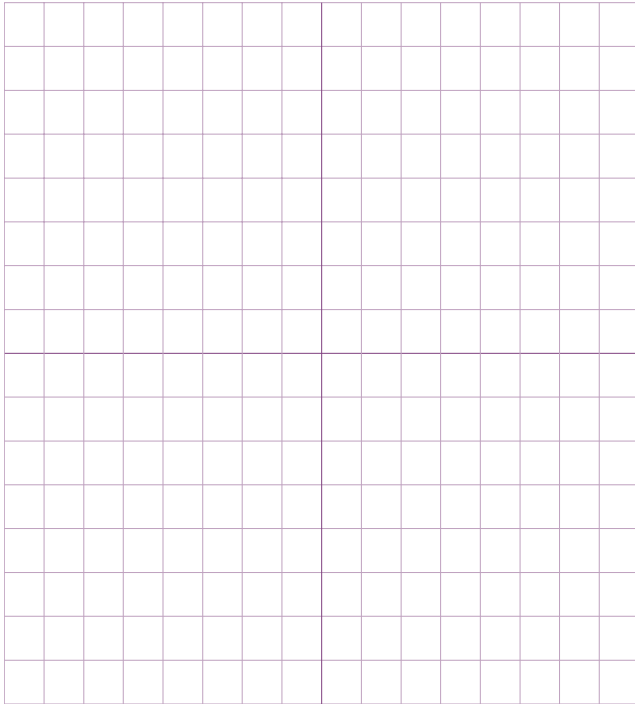
An entry in the table is the area under the curve between $Z = 0$ and a positive value of Z . Areas for negative values of Z are obtained by symmetry.



Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1433	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2703	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3642	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

ROUGH WORK FOR GRAPHING

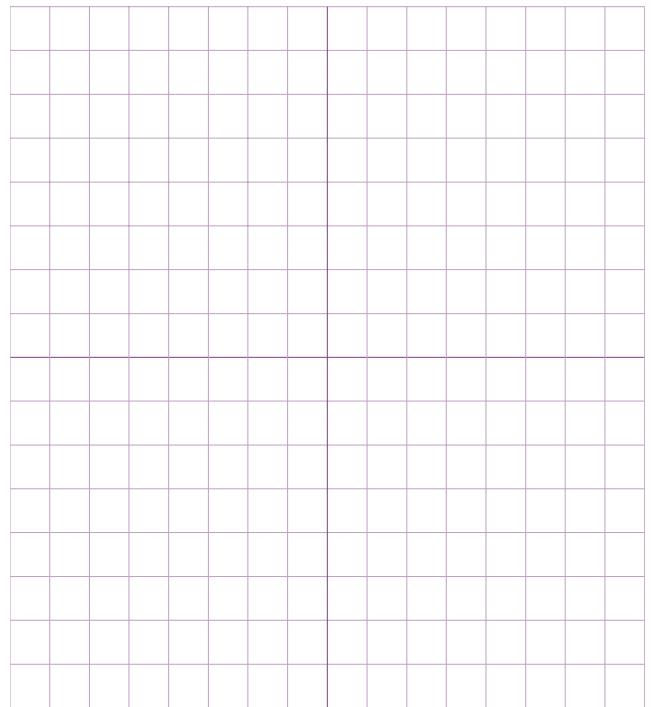
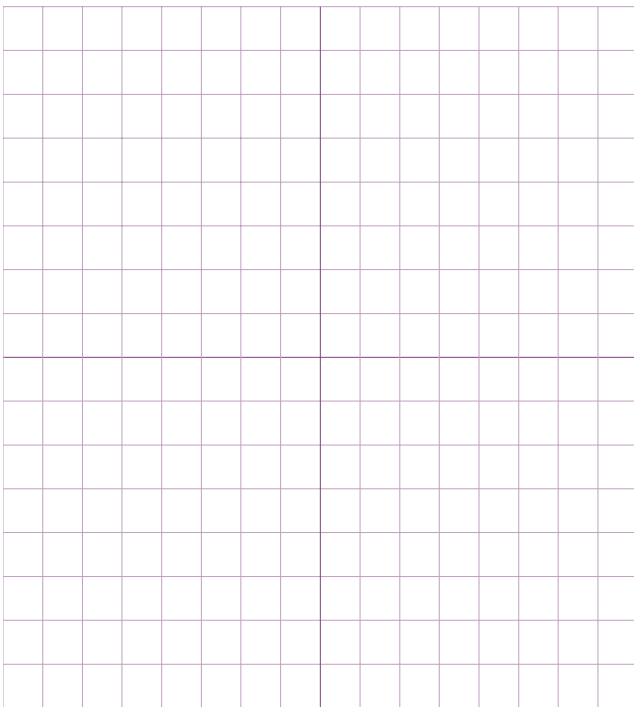
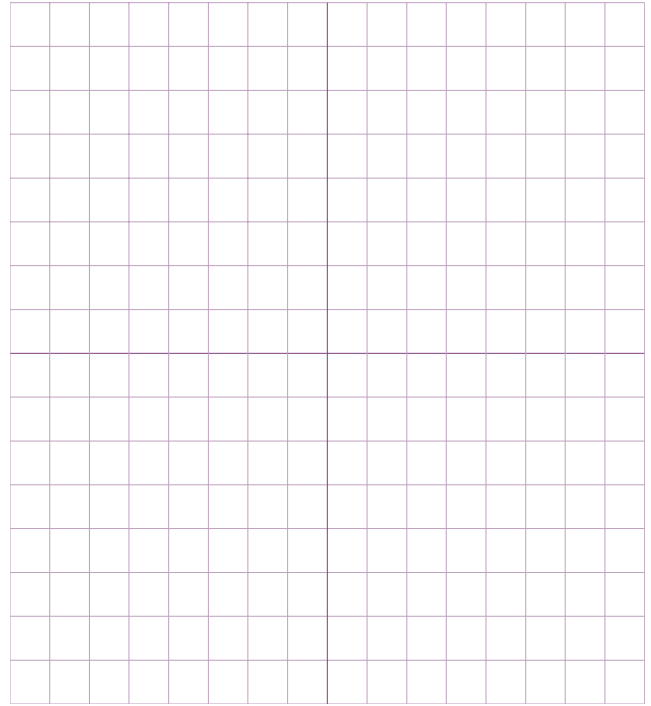
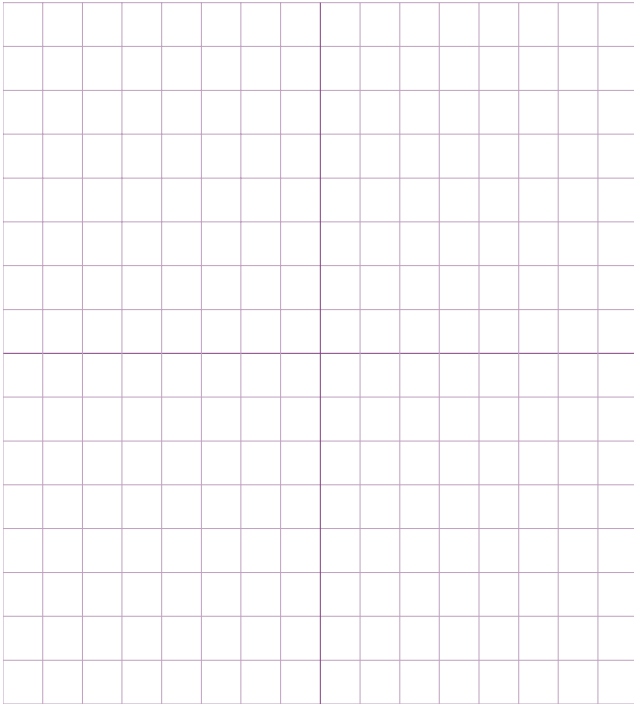
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ROUGH WORK FOR GRAPHING

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ROUGH WORK FOR MULTIPLE-CHOICE

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ROUGH WORK FOR MULTIPLE-CHOICE

