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Principles of Mathematics 12

August 2004

Course Code = MA

### 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	0	1	2			▪ (5) NR	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/> <input type="checkbox"/>	
Question 1b	0	1	2	3		▪ (5) NR	
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Question 2	0	1	2	3	4	▪ (5) NR	
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Question 3	0	1	2	3	4	5	▪ (5) NR
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Question 4a	0	1	2			▪ (5) NR	
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Question 4b	0	1	2			▪ (5) NR	
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Question 5a	0	1	2			▪ (5) NR	
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Question 5b	0	1	2			▪ (5) NR	
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Question 6	0	1	2	3	4	▪ (5) NR	
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Question 7	0	1	2	3	4	▪ (5) NR	
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# **PRINCIPLES OF MATHEMATICS 12**

**August 2004**

COURSE CODE = MA

## 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. Rough-work space has been incorporated into the space allowed for answering each written-response 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.*

## PRINCIPLES OF MATHEMATICS 12 PROVINCIAL EXAMINATION

- |   | Value           | Suggested Time     |
|---|-----------------|--------------------|
| 1. This examination consists of <b>two</b> parts: |                 |                    |
| PART A: 40 multiple-choice questions              | 60 marks        | 75 minutes         |
| PART B: 7 written-response questions              | 30 marks        | 45 minutes         |
| <b>Total:</b>                                     | <b>90 marks</b> | <b>120 minutes</b> |
2. The last **four** pages inside the back cover contain **A Summary of Basic Identities and Formulae, The Standard Normal Distribution Table, 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 Principles 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 graphing 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 values. If the statistical features of the calculator are used, it is important to show the function with the substitution of the relevant numbers. For example: in part of the solution it is acceptable to show  $\text{normalcdf}(10, 40, 50, 20)$  or the equivalent syntax for the calculator used.
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: 60 marks**

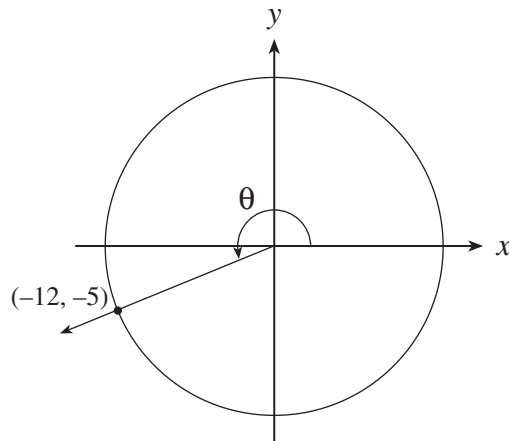
**Suggested Time: 75 minutes**

**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 on the Response Form that has the letter corresponding to your answer.

1. An arc of length  $x$  cm subtends an angle of  $\frac{2\pi}{5}$  radians at the centre of a circle with radius 10 cm. Determine the value of  $x$ .

- A. 7.20
- B.  $\frac{25}{\pi}$
- C. 10
- D.  $4\pi$

2. Determine  $\sec \theta$  using the information in the diagram below.



- A.  $-\frac{13}{12}$
- B.  $-\frac{13}{5}$
- C.  $\frac{13}{5}$
- D.  $\frac{13}{12}$

3. Determine the amplitude of the function  $y = -4 \sin 3x - 2$ .
- A. -4
  - B. -2
  - C. 2
  - D. 4
4. Solve:  $\log x = 2 \cos x$ ,  $0 < x < 2\pi$
- A. 0.17, 0.71
  - B. 1.38
  - C. 1.48, 5.07
  - D. 1.57, 5.11
5. Determine the exact value of  $\cot\left(-\frac{5\pi}{6}\right)$ .
- A.  $-\sqrt{3}$
  - B.  $-\frac{1}{\sqrt{3}}$
  - C.  $\frac{1}{\sqrt{3}}$
  - D.  $\sqrt{3}$
6. Determine the phase shift of the function:  $f(x) = \cos\left(\frac{1}{3}x - \pi\right)$
- A.  $\frac{\pi}{3}$  to the right
  - B.  $\pi$  to the right
  - C.  $3\pi$  to the right
  - D.  $6\pi$  to the right



7. Solve:  $\csc x + 2 = 0$ ,  $0 \leq x < 2\pi$

A.  $\frac{\pi}{6}, \frac{5\pi}{6}$

B.  $\frac{7\pi}{6}, \frac{11\pi}{6}$

C.  $\frac{\pi}{3}, \frac{5\pi}{3}$

D.  $\frac{2\pi}{3}, \frac{4\pi}{3}$

8. If  $A = B + 90^\circ$ , simplify  $\cos A \cos B + \sin A \sin B$ .

A. 0

B. 1

C.  $\cos 2B$

D.  $\cos(2B + 90^\circ)$

9. Determine the general solution for  $\sin 2x = 1$ .

A.  $x = \frac{\pi}{2} + n\pi$ ,  $n$  is an integer

B.  $x = \frac{\pi}{4} + n\pi$ ,  $n$  is an integer

C.  $x = \frac{\pi}{6} + 2n\pi, \frac{5}{6}\pi + 2n\pi$ ,  $n$  is an integer

D.  $x = \frac{\pi}{3} + 2n\pi, \frac{2}{3}\pi + 2n\pi$ ,  $n$  is an integer

10. Determine the number of terms in the geometric sequence:  $\frac{1}{81}, \frac{1}{27}, \frac{1}{9}, \dots, 531441$

A. 14

B. 15

C. 16

D. 17

**OVER**

11. Evaluate:  $\sum_{k=3}^{13} 5(-2)^{k-1}$

- A. 13660
- B. 13655
- C. -13651.67
- D. -13646.67

12. If \$600 is invested at 7% compounded quarterly, which expression will give the value of the investment in 9 years?

- A.  $600(1+0.07)^9$
- B.  $600\left(\frac{1+0.07}{4}\right)^{36}$
- C.  $600\left(1+\frac{0.07}{4}\right)^9$
- D.  $600\left(1+\frac{0.07}{4}\right)^{36}$

13. Determine the sum of the infinite geometric series:  $800 + 300 + \frac{225}{2} + \dots$

- A. 1280
- B. 1212.5
- C. 1254.69
- D. no finite sum

14. The third term of a geometric sequence is 3 and the sixth term is  $\frac{64}{9}$ . Find the fifth term of this sequence.

- A.  $\frac{27}{16}$
- B.  $\frac{16}{3}$
- C.  $\frac{32}{3}$
- D.  $\frac{256}{27}$

15. Determine an equation of the asymptote of  $y = 4 \log_2(x + 3) + 4$ .

- A.  $x = -3$
- B.  $x = 3$
- C.  $y = -4$
- D.  $y = 4$

16. Evaluate:  $5 \log_4 3$

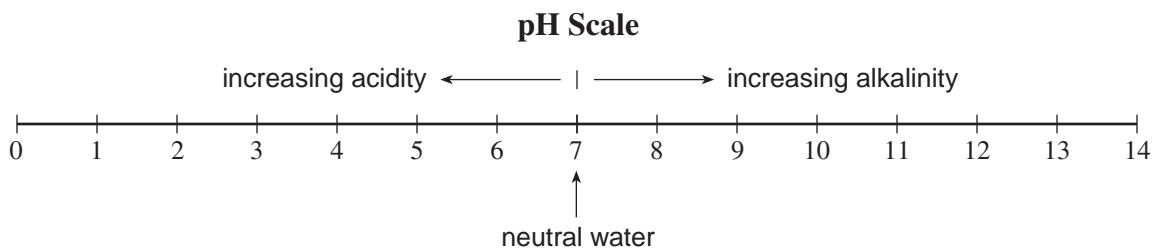
- A. 1.95
- B. 2.39
- C. 3.96
- D. 6.31

17. Express as a single logarithm:

$$\log a - \log b - 5 \log c$$

- A.  $\log \frac{ac^5}{b}$
- B.  $\log \frac{5ac}{b}$
- C.  $\log \frac{a}{5bc}$
- D.  $\log \frac{a}{bc^5}$

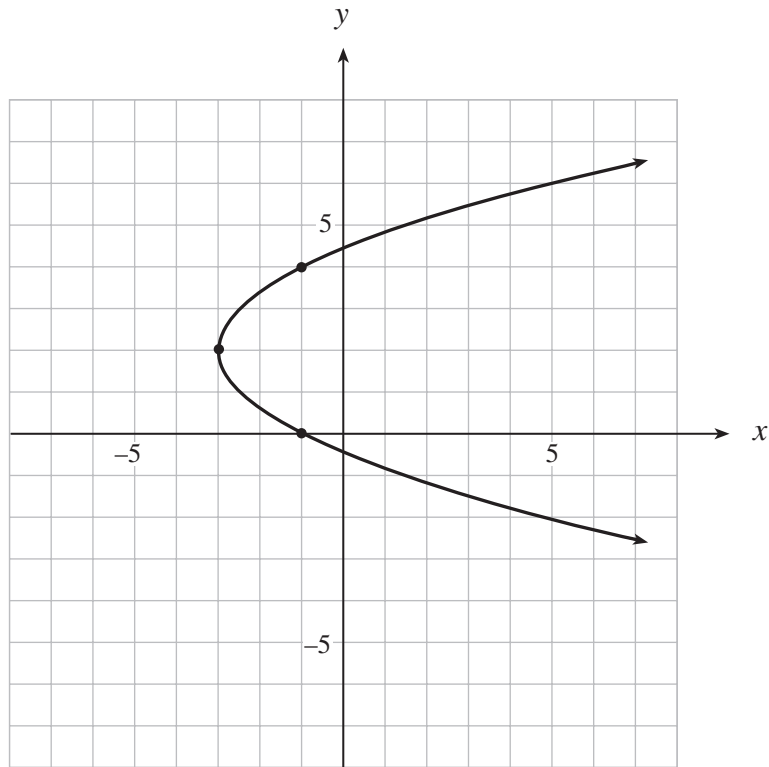
18. In chemistry, the pH scale measures the acidity (0–7) or alkalinity (7–14) of a solution. It is a logarithmic scale in base 10. Thus a pH of 9 is 10 times more alkaline than a pH of 8. An unknown solution is 40 times more alkaline than neutral water which has a pH of 7. Determine the pH of the unknown solution.



- A. 7.4
- B. 8.4
- C. 8.6
- D. 11

19. The population of rabbits is increasing by 70% every 6 months. Presently there are 200 rabbits. Determine an expression for the number of months it will take for the population to reach 800.
- A.  $6 \log_{1.7} 4$   
 B.  $\frac{1}{6} \log_{1.7} 4$   
 C.  $4 \log_{1.7} 6$   
 D.  $\frac{1}{4} \log_{1.7} 6$
20. If  $f(x) = 10^{x-3} + 4$ , find  $f^{-1}(x)$ , the inverse of  $f(x)$ .
- A.  $f^{-1}(x) = \log(x-3) + 4$   
 B.  $f^{-1}(x) = \log(x-4) + 3$   
 C.  $f^{-1}(x) = 10^{3-x} + 4$   
 D.  $f^{-1}(x) = \frac{1}{10^{x-3} + 4}$
21. Determine the value of  $\log_n ab^2$  if  $\log_n a = 5$  and  $\log_n b = 3$ .
- A. 11  
 B. 14  
 C. 16  
 D. 45
22. Which equation below represents a hyperbola with asymptotes  $y = \pm \frac{3}{2}x$ ?
- A.  $\frac{x^2}{9} - \frac{y^2}{4} = 1$   
 B.  $\frac{x^2}{4} - \frac{y^2}{9} = 1$   
 C.  $\frac{x^2}{3} - \frac{y^2}{2} = 1$   
 D.  $\frac{x^2}{2} - \frac{y^2}{3} = 1$

23. Determine an equation of the parabola graphed below.



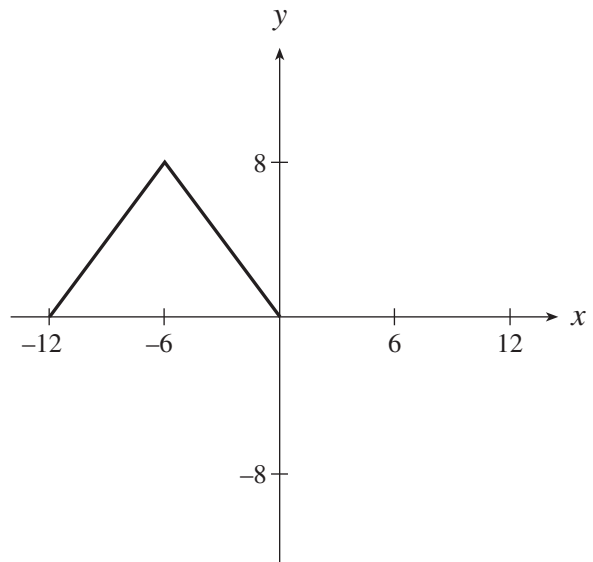
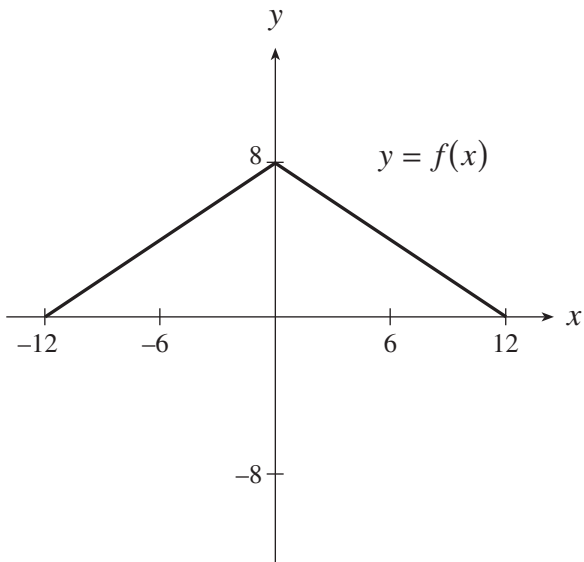
- A.  $x = \frac{1}{2}(y - 2)^2 + 3$
- B.  $x = \frac{1}{2}(y - 2)^2 - 3$
- C.  $x = \frac{1}{3}(y - 2)^2 + 3$
- D.  $x = \frac{1}{3}(y - 2)^2 - 3$

24. An ellipse is defined by  $3x^2 + 2y^2 = k$  and the length of its major axis is 6. Determine the value of  $k$ .

- A. 108
- B. 72
- C. 27
- D. 18

25. Which equation represents the graph of  $y = g(x)$  after it is reflected in the line  $y = x$  ?
- A.  $y = g(-x)$
  - B.  $y = -g(x)$
  - C.  $y = \frac{1}{g(x)}$
  - D.  $x = g(y)$
26. How is the graph of  $y = \frac{1}{2}f(x)$  related to the graph of  $y = f(x)$  ?
- A.  $y = f(x)$  has been expanded vertically by a factor of 2.
  - B.  $y = f(x)$  has been expanded horizontally by a factor of 2.
  - C.  $y = f(x)$  has been compressed vertically by a factor of  $\frac{1}{2}$ .
  - D.  $y = f(x)$  has been compressed horizontally by a factor of  $\frac{1}{2}$ .
27. If the range of  $y = f(x)$  is  $-1 \leq y \leq 2$ , what is the range of  $y = \frac{1}{f(x)}$  ?
- A.  $-1 \leq y \leq \frac{1}{2}$
  - B.  $-1 \leq y \leq \frac{1}{2}, y \neq 0$
  - C.  $y \geq \frac{1}{2}$  or  $y \leq -1$
  - D.  $y \geq 2$  or  $y \leq -1$

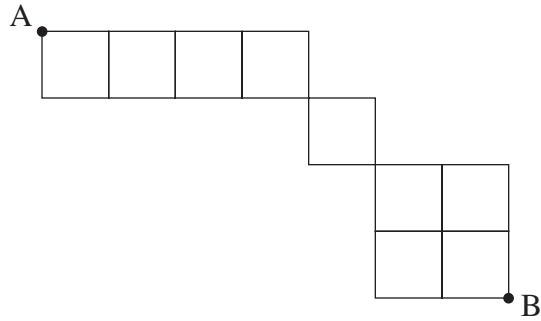
28. The function  $y = f(x)$  is graphed to the left below. Determine an equation of the function shown on the right.



- A.  $y = f(2x)$   
B.  $y = f(2x + 6)$   
C.  $y = f(2x - 6)$   
D.  $y = f(2x + 12)$
29. Determine the number of terms in the expansion of  $(a + b)^7$ .

- A. 6  
B. 7  
C. 8  
D. 9

30. Moving only to the right or down, determine the number of different pathways from A to B.



- A. 13
- B. 24
- C. 60
- D. 80

31. Codes with 5 digits are made from the digits 1, 2, 3, 4, 5, 6, 7, 8, 9. If repetitions are not permitted and each code must contain 2 odd digits followed by 3 even digits, determine the number of different codes that can be made.

- A. 126
- B. 480
- C. 1600
- D. 15120



**Use the following information to answer questions 32 and 33.**

A class of 14 students is made up of 6 girls and 8 boys. From this class, a group of 5 students is chosen to represent the class at a competition.

32. Determine the number of different groups of 5 that can be formed if there must be 2 girls and 3 boys in each group.

A. 71  
B. 560  
C. 840  
D. 10 080

33. Determine the number of different groups of 5 that can be formed if there must be at most 1 boy in each group.

A. 23  
B. 30  
C. 120  
D. 126

34. Two fair six-sided dice are rolled and the face values are added. What is the probability of obtaining a sum that is an even number less than 8?

A.  $\frac{1}{4}$   
B.  $\frac{7}{18}$   
C.  $\frac{1}{2}$   
D.  $\frac{7}{12}$

35. A bag contains 4 red marbles and 5 blue marbles. If two marbles are drawn from the bag without replacement, determine the probability that they are both red.
- A.  $\frac{4}{27}$
  - B.  $\frac{1}{6}$
  - C.  $\frac{5}{18}$
  - D.  $\frac{59}{72}$
36. There are 10 horses in a race. A particular bet requires a customer to choose the first three horses in the correct finishing order. If all 10 horses have an equal chance of finishing in any position, determine the probability that a single bet wins.
- A. 0.0014
  - B. 0.0083
  - C. 0.125
  - D. 0.3
37. A coin is biased such that  $P(\text{head}) = 0.6$ . If this coin is tossed 10 times, calculate the probability of getting between 6 and 8 heads inclusive.
- A. 0.3359
  - B. 0.4133
  - C. 0.5867
  - D. 0.6641

38. Determine the standard deviation for the population of scores in the following frequency table.

Score	Frequency
60	5
70	7
80	3
90	9

- A. 11.2  
B. 11.8  
C. 12.2  
D. 12.9
39. A manufacturer of a particular computer part has determined that the life expectancy of the part is normally distributed with a mean of 4000 h and a standard deviation of 160 h. If the manufacturer makes 5200 parts, how many parts would be expected to last fewer than 3700 h?
- A. 155  
B. 158  
C. 160  
D. 162
40. It is estimated that 20% of teenagers smoke at least 10 cigarettes daily. Use the normal approximation to the binomial distribution to determine the probability that between 45 and 55 teenagers from 200 randomly chosen teenagers smoke at least 10 cigarettes daily.
- A. 0.161  
B. 0.184  
C. 0.207  
D. 0.210

**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: 30 marks

Suggested Time: 45 minutes

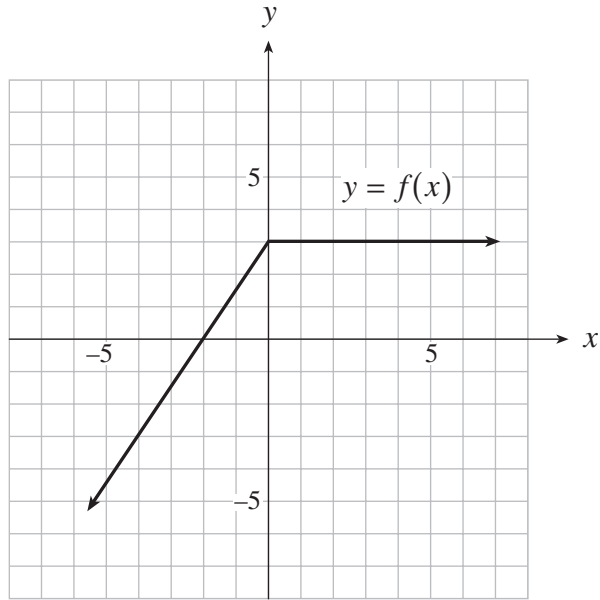
**INSTRUCTIONS:** Rough-work space has been incorporated into the space allowed for answering each question. You may not need all the space provided to answer each question. Where required, place the final answer for each question in the space provided.

If, in a justification, you refer to information produced by the graphing 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 values. If the statistical features of the calculator are used, it is important to show the function with the substitution of the relevant numbers. For example: in part of the solution it is acceptable to show  $\text{normalcdf}(10, 40, 50, 20)$  or the equivalent syntax for the calculator used.

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.

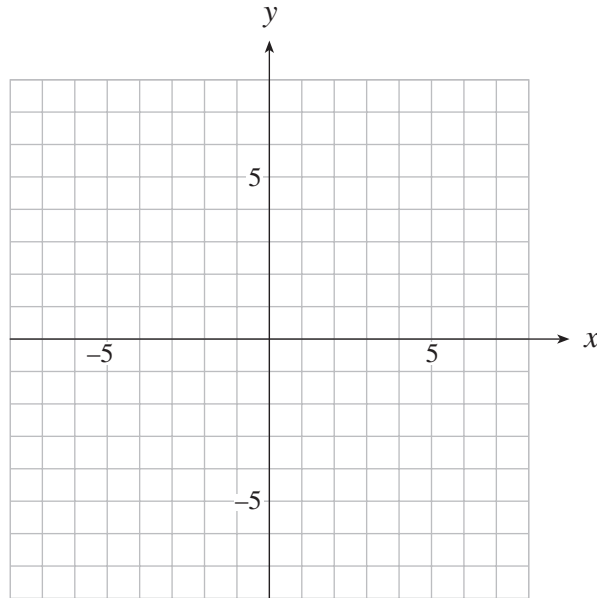
**Full marks will NOT be given for the final answer only.**

1. The function  $y = f(x)$  is graphed below.



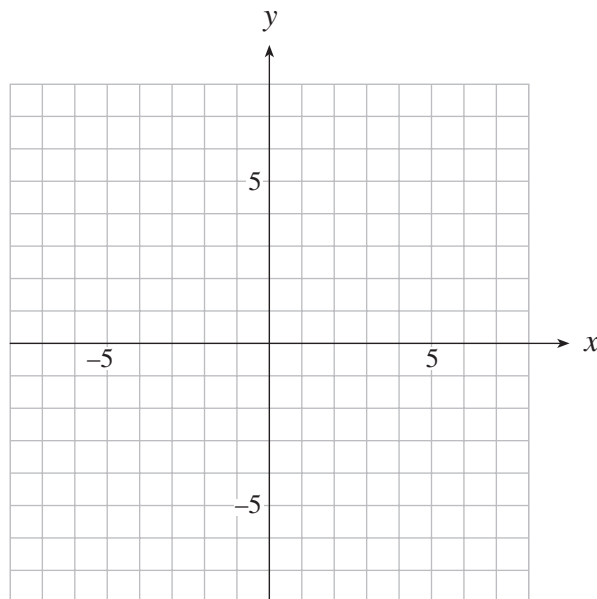
a) On the grid provided, sketch the graph of  $y = -f(x + 3)$ .

(2 marks)



b) On the grid provided, sketch the graph of  $y = 2|f(x)| - 3$ .

(3 marks)



OVER

2. Change  $4x^2 - y^2 - 2y + 3 = 0$  to standard form.

**(4 marks)**



ANSWER:

3. Solve algebraically:  $\log(3 - x) + \log(4 - 3x) - \log x = \log 7$

**(5 marks)**

ANSWER:

4. In one of the provinces, 86% of all homes have a television, 50% of all homes have a television and a stereo, and 2% have neither a television nor a stereo.
- a) What is the probability that a randomly selected home in this province has a stereo?  
**(2 marks)**

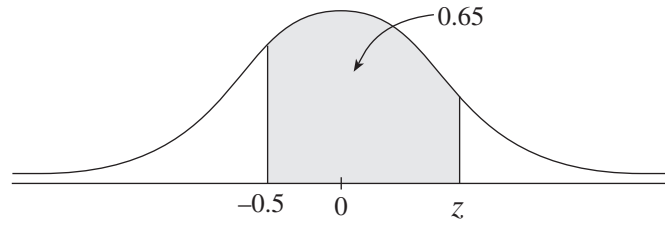
ANSWER:

- b) Given that a randomly selected home in this province has a television, what is the probability that this home does **not** have a stereo? **(2 marks)**

ANSWER:

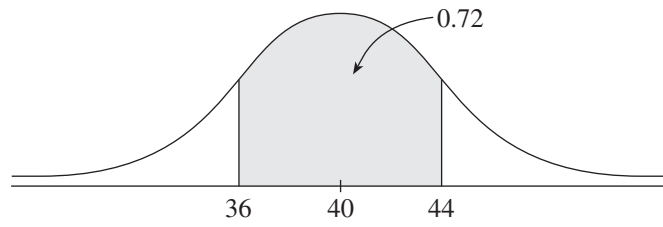
**OVER**

5. a) The shaded area under the standard normal curve shown is 0.65. Determine  $z$ . (2 marks)



ANSWER:

- b) The shaded area under the normal curve shown is 0.72. If the mean for this distribution is 40, determine the standard deviation. **(2 marks)**

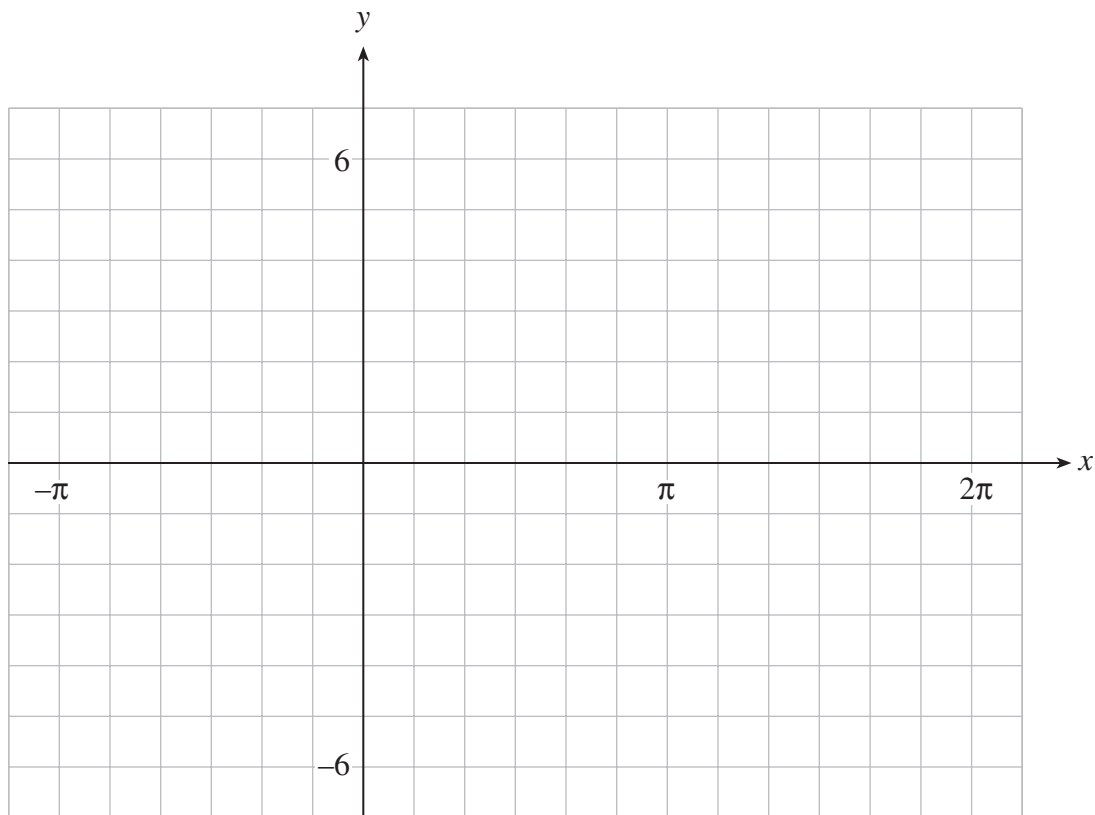


ANSWER:

**OVER**

6. A sinusoidal curve has a minimum point at  $\left(-\frac{\pi}{3}, -5\right)$  and the closest maximum point to the right is  $\left(\frac{\pi}{6}, 3\right)$ . Determine an equation of this curve. **(4 marks)**

**A grid is provided for rough work only.**





ANSWER:

7. Prove the identity:

(4 marks)

$$\frac{1 - \cos 2x}{\sin 2x} = \frac{1 + \tan x}{1 + \cot x}$$

LEFT SIDE	RIGHT SIDE

**END OF EXAMINATION**

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## A SUMMARY OF BASIC IDENTITIES AND FORMULAE

### Pythagorean Identities:

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$1 + \tan^2 \theta = \sec^2 \theta$$

$$1 + \cot^2 \theta = \csc^2 \theta$$

### Reciprocal and Quotient Identities:

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

### Addition Identities:

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

### Double-Angle Identities:

$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta$$

$$\sin 2\theta = 2 \sin \theta \cos \theta$$

$$= 2 \cos^2 \theta - 1$$

$$= 1 - 2 \sin^2 \theta$$

### Formulae:

$$t_n = ar^{n-1}$$

$$S_n = \frac{a(1-r^n)}{1-r}$$

$$S_n = \frac{a-r\ell}{1-r}$$

$$S = \frac{a}{1-r}$$

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

### Probability and Statistics:

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

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

$$t_{k+1} = {}_n C_k a^{n-k} b^k$$

$$P(\bar{A}) = 1 - P(A)$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A | B) = \frac{P(A \text{ and } B)}{P(B)}$$

$$P(A \text{ and } B) = P(A) \times P(B | A)$$

$$P(x) = {}_n C_x p^x q^{n-x} \quad (q = 1 - p)$$

$$\mu = \frac{\sum x_i}{n}$$

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

$$\mu = np$$

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

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

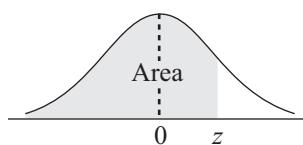
**Note:** Graphing calculators will contain many of these formulae as pre-programmed functions.

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## THE STANDARD NORMAL DISTRIBUTION TABLE



$$F_z(z) = P[Z < z]$$

$z$	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0017	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0352	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0722	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
-0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

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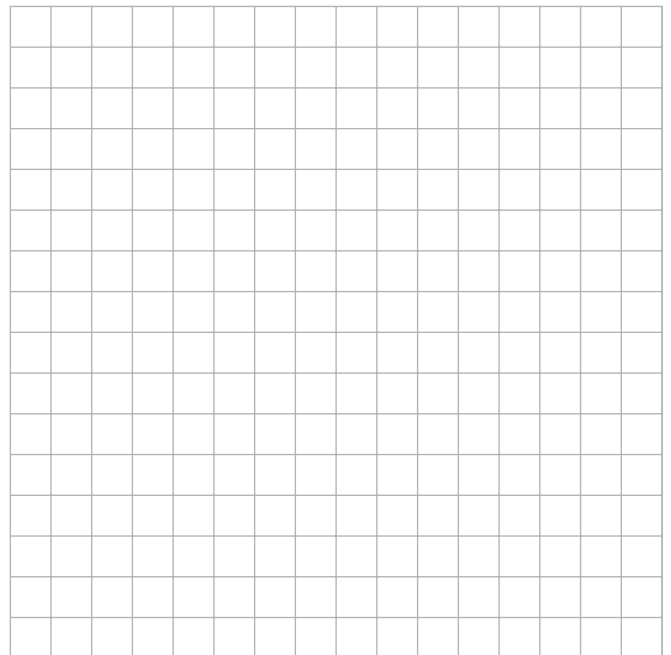
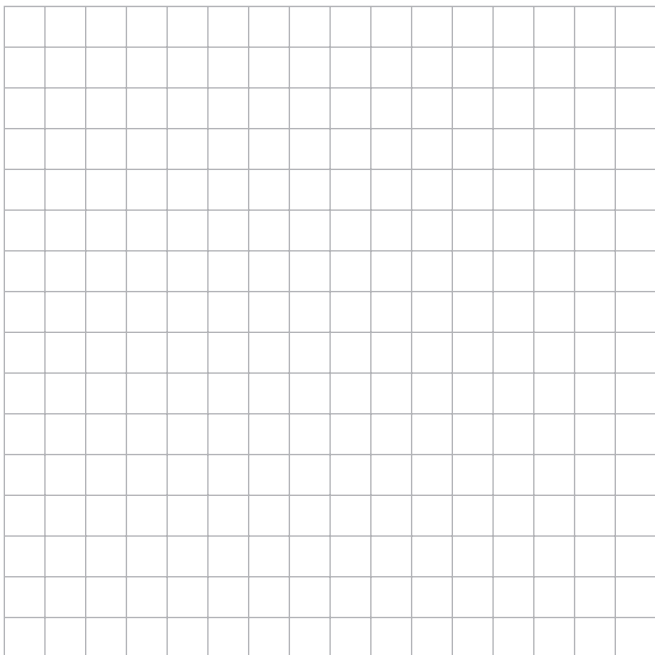
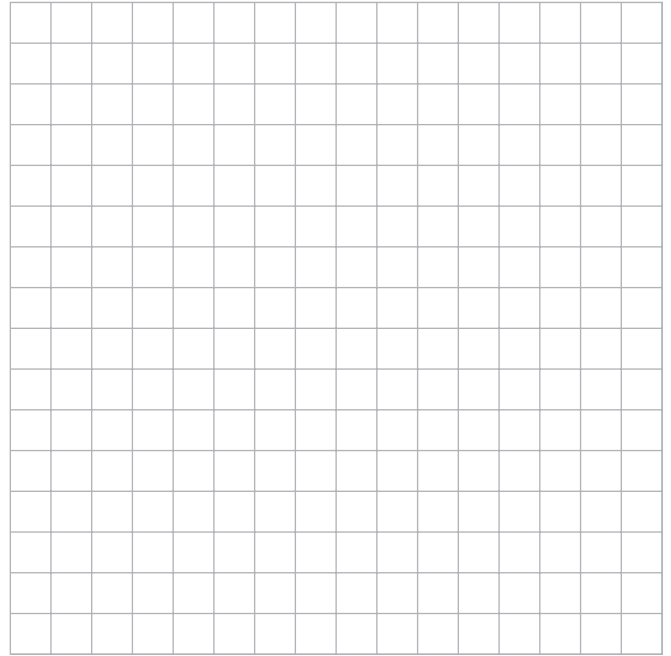
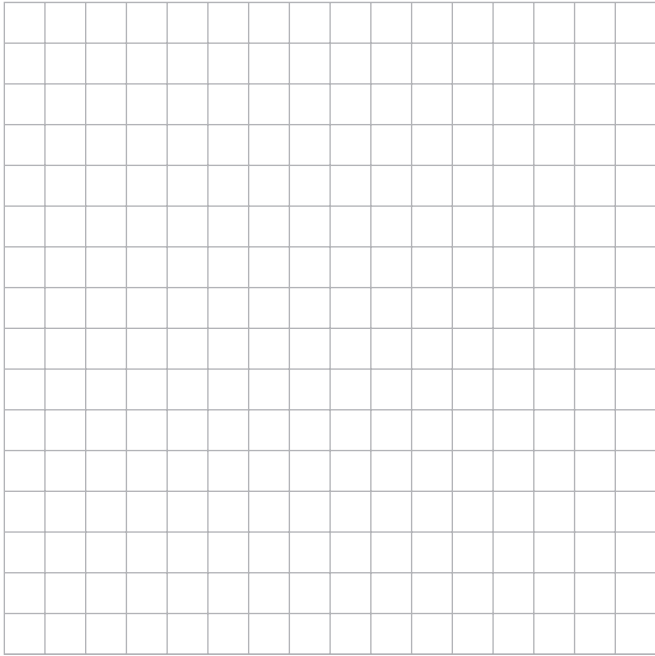
$$F_z(z) = P[Z < z]$$

<b>z</b>	<b>0.00</b>	<b>0.01</b>	<b>0.02</b>	<b>0.03</b>	<b>0.04</b>	<b>0.05</b>	<b>0.06</b>	<b>0.07</b>	<b>0.08</b>	<b>0.09</b>
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9278	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998



# ROUGH WORK FOR GRAPHING

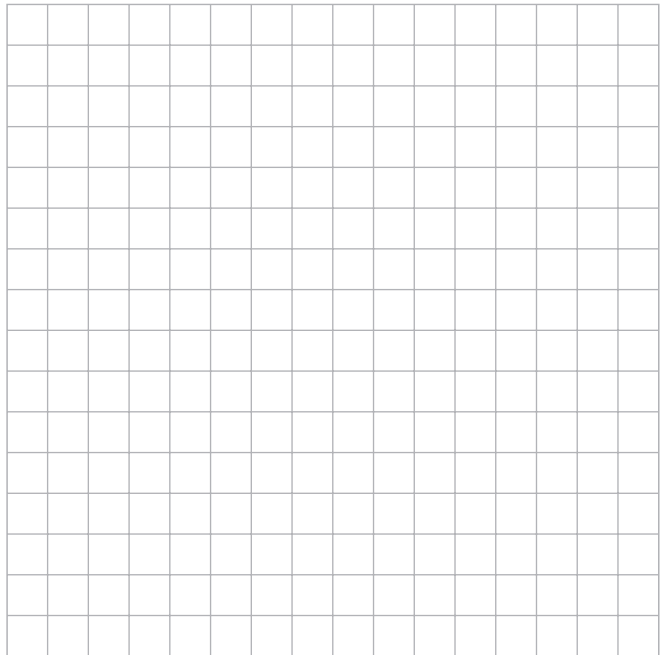
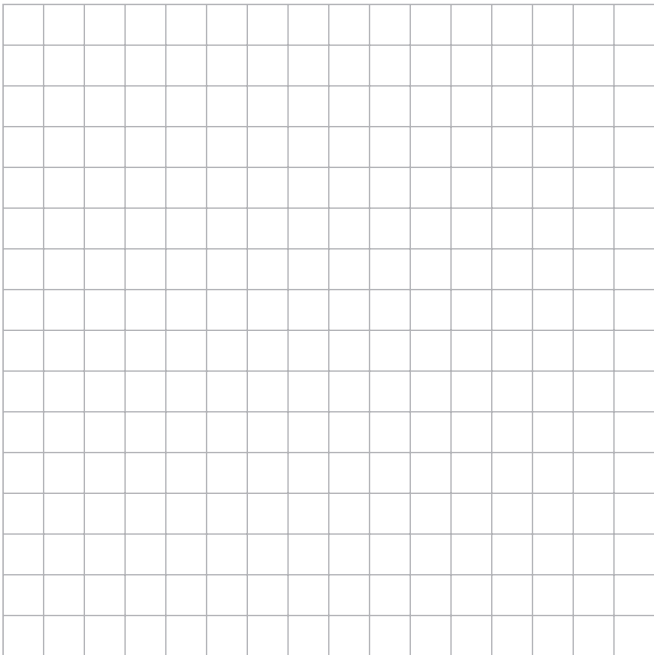
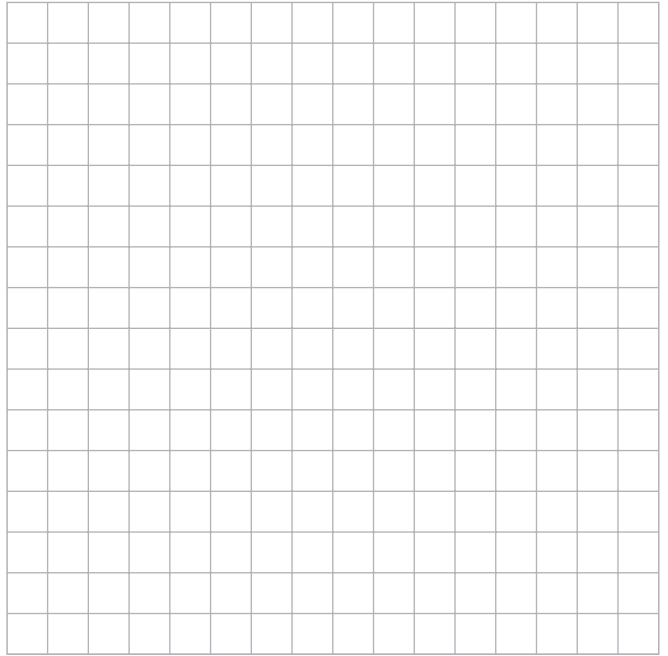
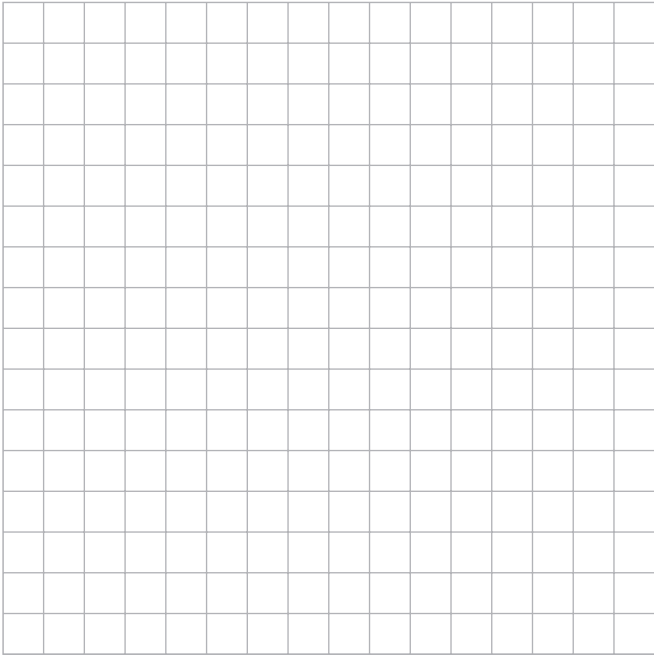
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# ROUGH WORK FOR GRAPHING

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**ROUGH WORK FOR MULTIPLE-CHOICE**

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## **ROUGH WORK FOR MULTIPLE-CHOICE**