



Principles of Mathematics 12

Examination Booklet
August 2006
Form A

DO NOT OPEN ANY EXAMINATION MATERIALS UNTIL INSTRUCTED TO DO SO.
FOR FURTHER INSTRUCTIONS REFER TO THE RESPONSE BOOKLET.

PART A: MULTIPLE CHOICE (non-calculator)
SECTION I

Value: 24 marks

Suggested Time: 35 minutes
Allowable Time: 45 minutes

INSTRUCTIONS: No calculator may be used for this section of the examination. For each question, select the **best** answer and record your choice on the **blue Answer Sheet** provided. Using an HB pencil, completely fill in the bubble that has the letter corresponding to your answer.

You have **Examination Booklet Form A**. In the box above #1 on your **Answer Sheet**, fill in the bubble as follows.

Exam Booklet Form/ Cahier d'examen	A	B	C	D	E	F	G	H
	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

1. Determine the amplitude of the function $y = -4 \cos(x - 2)$.

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

2. A circle has a radius of 12 cm. If the central angle is 45° , as shown in the diagram, determine the length of arc AB.

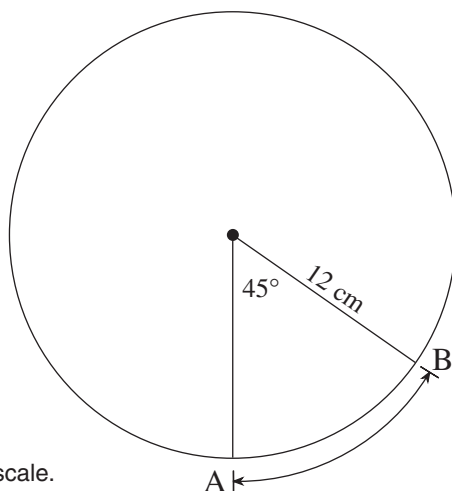
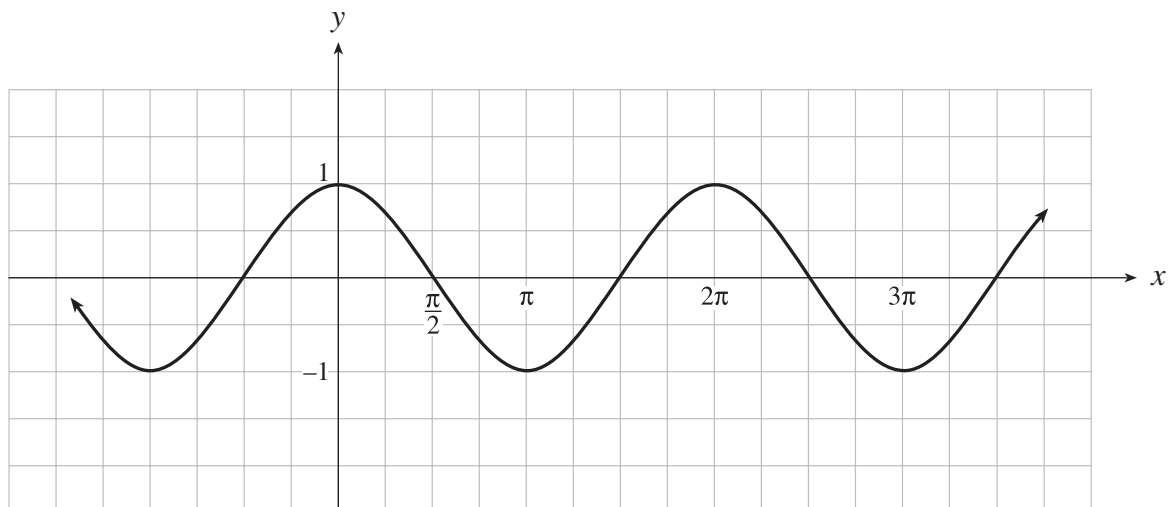


Diagram not drawn to scale.

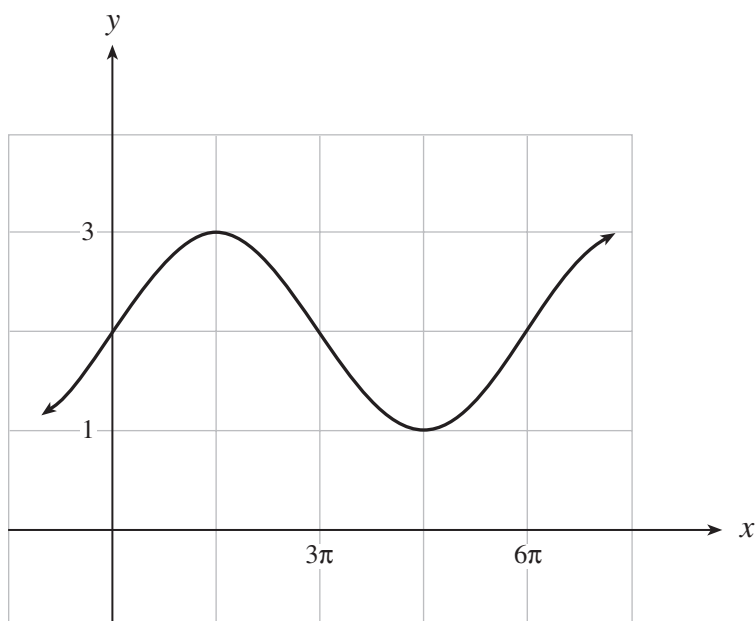
- A. 2π cm
- B. 3π cm
- C. 4π cm
- D. 6π cm

3. Which equation represents the function graphed below?



- A. $y = \cos\left(x + \frac{\pi}{2}\right)$
- B. $y = \sin\left(x - \frac{\pi}{2}\right)$
- C. $y = -\cos\left(x - \frac{\pi}{2}\right)$
- D. $y = -\sin\left(x - \frac{\pi}{2}\right)$

4. If the graph of the function shown below has the equation $y = a \sin bx + d$, determine the value of b ($b > 0$).



- A. $\frac{1}{3}$
 B. 3
 C. 2π
 D. 6π
5. Determine an equivalent expression to $\sin(2x - \pi)$.
- A. $2 \sin x \cos x$
 B. $-2 \sin x \cos x$
 C. $\cos^2 x - \sin^2 x$
 D. $\sin^2 x - \cos^2 x$
6. Determine the number of solutions for $(a \sin x - b)(a \cos x - a)(b \sin x + a) = 0$ where $0 \leq x < 2\pi$, if $0 < a < b$.
- A. 3
 B. 4
 C. 5
 D. 6

7. Change $\log_a p = t$ to exponential form.

- A. $p^t = a$
- B. $a^t = p$
- C. $a^p = t$
- D. $t^p = a$

8. Determine an equivalent expression for $\log a + 2\log b - 3\log c$.

- A. $\log \frac{ab^2}{c^3}$
- B. $\log \frac{a}{b^2c^3}$
- C. $\log \frac{a}{6bc}$
- D. $\log \frac{2ab}{3c}$

9. Solve: $\log_5(3x) - \log_5(x - 3) = 2$

- A. -6
- B. $-\frac{1}{2}$
- C. $\frac{75}{22}$
- D. 11

10. Solve: $9^{x+2} = (3^{4x-3})(3^5)$

A. 0

B. 1

C. $\frac{17}{19}$

D. $\frac{19}{18}$

11. Determine the radius of the circle $16x^2 + 16y^2 = 25$.

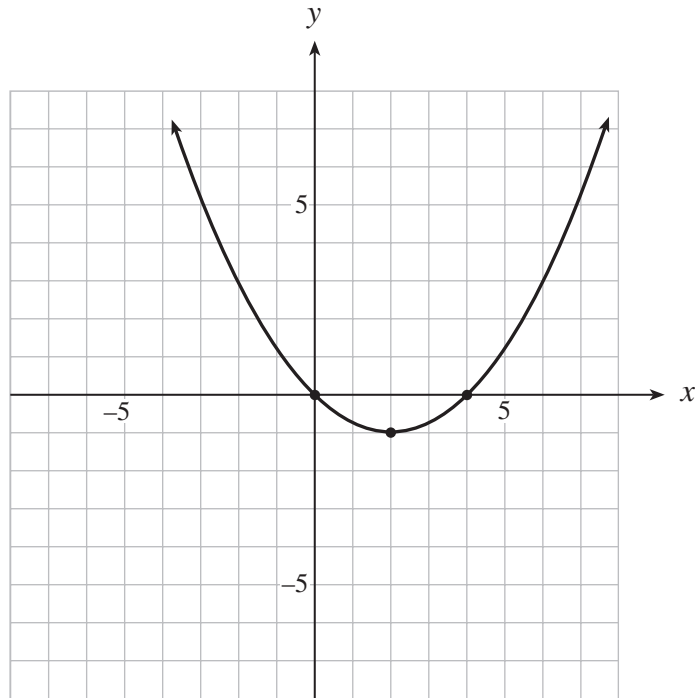
A. $\frac{5}{4}$

B. $\frac{25}{16}$

C. 5

D. 25

12. Determine an equation of the parabola graphed below.



A. $y = \frac{1}{4}(x-2)^2 - 1$

B. $y = \frac{1}{2}(x-2)^2 - 1$

C. $y = 2(x-2)^2 - 1$

D. $y = 4(x-2)^2 - 1$

13. The equation $x^2 + Cy^2 + F = 0$ represents a hyperbola. What conditions must be satisfied if the hyperbola has a vertical transverse axis?

A. $C > 0, F < 0$

B. $C > 0, F > 0$

C. $C < 0, F < 0$

D. $C < 0, F > 0$

14. Determine a possible value for D such that $x^2 + y^2 + Dx - 6y - 4 = 0$ represents a circle with radius 7.
- A. 6
B. 12
C. 18
D. 36
15. Which equation represents the graph of $\frac{(x-2)^2}{4} + \frac{(y-3)^2}{9} = 1$ after it is translated 5 units to the right and 1 unit up?
- A. $\frac{(x-7)^2}{4} + \frac{(y-4)^2}{9} = 1$
B. $\frac{(x-7)^2}{4} + \frac{(y-2)^2}{9} = 1$
C. $\frac{(x+3)^2}{4} + \frac{(y-4)^2}{9} = 1$
D. $\frac{(x+3)^2}{4} + \frac{(y-2)^2}{9} = 1$
16. Which equation represents the graph of $y = 2^x$ after it is reflected in the x -axis?
- A. $y = 2^{-x}$
B. $y = -2^x$
C. $y = \log_2 x$
D. $y = -\log_2 x$

This is the end of Part A, Section I.

You may proceed to the rest of the examination *without* the use of a calculator until directed by the supervisor to access your calculator. At the end of 45 minutes, you will not be able to go back to Part A, Section I; therefore, ensure you have checked this section.

PART A: MULTIPLE CHOICE
SECTION II

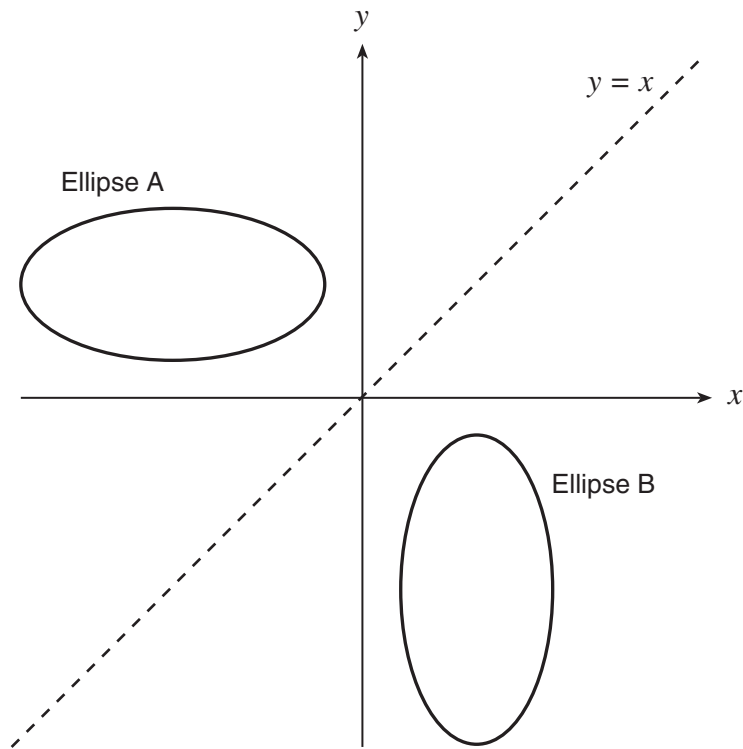
Value: 42 marks

Suggested Time: 55 minutes

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

17. How is the graph of $y = f(4x)$ related to the graph of $y = f(x)$?
- A. $y = f(x)$ has been compressed vertically by a factor of $\frac{1}{4}$.
 - B. $y = f(x)$ has been compressed horizontally by a factor of $\frac{1}{4}$.
 - C. $y = f(x)$ has been expanded vertically by a factor of 4.
 - D. $y = f(x)$ has been expanded horizontally by a factor of 4.
18. If the maximum value of the function $y = f(x)$ is 6, determine the maximum value of $y = \frac{1}{3}f\left(\frac{1}{2}x\right)$.
- A. 2
 - B. 3
 - C. 12
 - D. 18
19. If the point $(-2, -5)$ is on the graph of $y = f(x)$, which point must be on the graph of $y = |f(x-1)| - 3$?
- A. $(-3, 2)$
 - B. $(-1, 2)$
 - C. $(1, -8)$
 - D. $(3, -8)$
20. Which conic is formed by the intersection of a plane and a double-napped cone when the intersecting plane is parallel to the generator of the cone?
- A. circle
 - B. ellipse
 - C. parabola
 - D. hyperbola

21. The following diagram shows two ellipses that are the reflections of one another in the line $y = x$. If an equation of ellipse A is $\frac{(x-d)^2}{a^2} + \frac{(y-e)^2}{b^2} = 1$, determine an equation of ellipse B.



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

22. Let θ be an angle in standard position such that $\cot \theta = -\frac{4}{3}$ and $\sin \theta < 0$.

Determine the exact value of $\sec \theta$.

A. $-\frac{5}{3}$

B. $-\frac{5}{4}$

C. $\frac{5}{4}$

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

23. A wheel rolling along the ground has a diameter of 16 cm and rotates every 12 seconds. At time $t = 0$ s, a point P on the outside edge of the wheel is at its highest point. Determine a cosine function that gives the height, h , of point P above the ground at any time, t , where h is in cm and t is in seconds.

A. $h(t) = -8 \cos \frac{\pi}{6} t + 8$

B. $h(t) = 8 \cos \frac{\pi}{12} t + 8$

C. $h(t) = 8 \cos \frac{\pi}{6} t + 8$

D. $h(t) = -8 \cos \frac{\pi}{12} t + 8$

24. Determine the sum of the infinite geometric series $3 + \frac{6}{5} + \frac{12}{25} + \dots$

A. 5

B. 7.5

C. 12.5

D. 15

25. Determine the sum of the first 10 terms of the geometric series $-36 + 24 - 16 + \dots$

A. -21.23

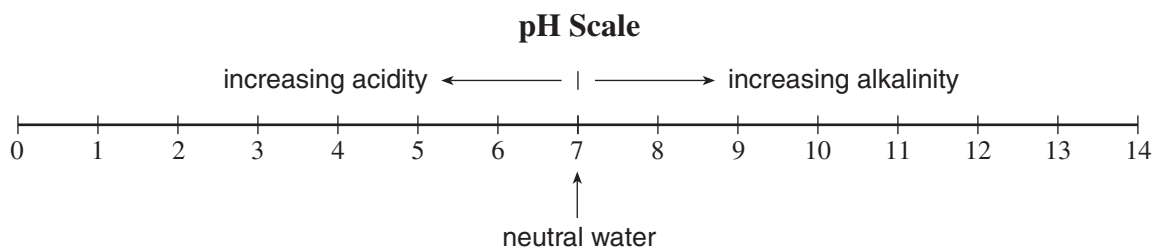
B. -21.60

C. -21.97

D. -22.16

26. What is the first term of the geometric series defined by $\sum_{k=3}^7 5\left(-\frac{1}{2}\right)^{k-1}$?
- A. $-\frac{5}{2}$
B. $-\frac{5}{8}$
C. $\frac{5}{4}$
D. 5
27. A ball is dropped from a height of 4 m. After each bounce, the ball rises to 70% of its previous height. What is the maximum height the ball will reach after it hits the ground for the 5th time?
- A. 0.47 m
B. 0.67 m
C. 0.96 m
D. 11.09 m
28. If x , 6, $3x$ are three consecutive terms in a geometric sequence, determine the values of x .
- A. ± 1
B. $\pm\sqrt{3}$
C. ± 2
D. $\pm 2\sqrt{3}$
29. A population grows continuously according to the formula $P = P_0e^{kt}$, where P is the final population in t years, P_0 is the initial population and k is the continuous growth rate. What will be the population in 7 years if the initial population is 25 000 and the continuous growth rate is 1.2%?
- A. 27 191
B. 57 909
C. 177 113
D. 197 312

30. 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 5 is 10 times more **acidic** than a pH of 6. Solution A has a pH of 5.7. Solution B is 1260 times more **acidic** than Solution A. Find the pH of solution B.

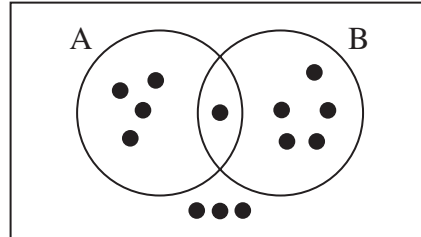


- A. 2.6
B. 4.4
C. 7.0
D. 8.8
31. How many permutations are there using all of the letters in the word P E P P E R ?
- A. 60
B. 120
C. 360
D. 720
32. In a particular city, all of the streets run continuously north-south or east-west. The mayor lives 4 blocks east and 5 blocks north of city hall. Determine the number of different routes, 9 blocks in length, that the mayor can take to get to city hall.
- A. 20
B. 126
C. 3 024
D. 15 120
33. In the expansion of $(x + y)^{10}$, determine the coefficient of the term containing x^8y^2 .
- A. 9
B. 10
C. 36
D. 45

34. In a standard deck of 52 cards, how many different 4-card hands are there that contain at most one heart?
- A. 91 403
 B. 118 807
 C. 188 474
 D. 201 058

35. In a library, 4 different English books, 2 different Chemistry books and 3 different Mathematics books are arranged on a shelf. Determine the number of different arrangements for the 9 books if the books on each subject must be kept together.
- A. 24
 B. 288
 C. 1260
 D. 1728

36. The diagram shows a sample space of 13 equally likely outcomes.

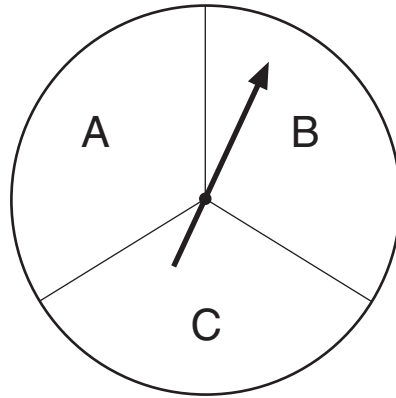


Determine $P(B)$.

- A. $\frac{5}{13}$
 B. $\frac{6}{13}$
 C. $\frac{5}{10}$
 D. $\frac{6}{10}$

37. A 7-card hand is dealt from a standard deck of 52 cards. What is the probability that the hand will contain 5 black cards and 2 red cards?
- A. 0.0076
 - B. 0.0148
 - C. 0.1598
 - D. 0.1640

38. If the spinner is spun 7 times, determine the probability that it will stop on either section A or B at least 5 times.



- A. 0.0069
 - B. 0.0453
 - C. 0.2634
 - D. 0.5706
39. Given a normal curve with mean 50 and standard deviation 10, determine the value of $P(45 < X < 52)$.
- A. 0.0415
 - B. 0.2333
 - C. 0.2707
 - D. 0.3075

40. During a figure skating competition, figure skaters received scores as shown in the table below.

SCORE	FREQUENCY
5.5	9
5.6	7
5.7	7
5.8	5
5.9	3
6.0	2

Determine the mean score for the 33 skaters in this competition.

- A. 5.43
 - B. 5.50
 - C. 5.68
 - D. 5.75
41. In a population that has a normal distribution with mean μ and standard deviation σ , determine the approximate percent of the population that lies between $\mu - 2\sigma$ and $\mu + \sigma$.
- A. 68%
 - B. 82%
 - C. 95%
 - D. 99%

Use the following information to answer questions 42 and 43.

The heights of students are normally distributed with mean $\mu = 157$ cm and standard deviation $\sigma = 12$ cm. Samantha and James are students.

42. If Samantha's height is 1.35 standard deviations above the mean, determine her height in centimetres.
- A. 158
 - B. 169
 - C. 171
 - D. 173
43. If only 35% of students are taller than James, determine his height in centimetres.
- A. 152
 - B. 157
 - C. 162
 - D. 165

44. A fair coin is tossed 60 times. Using the normal approximation to the binomial distribution, calculate the probability that a head will show between 32 and 36 times inclusive.
- A. 0.2421
 - B. 0.3026
 - C. 0.3032
 - D. 0.3037

You have **Examination Booklet Form A**. In the box above #1 on your **Answer Sheet**, ensure you filled in the bubble as follows.

Exam Booklet Form/ Cahier d'examen	A	B	C	D	E	F	G	H
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This is the end of the multiple-choice section.
Answer the remaining questions directly in the Response Booklet.

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:

$$t_n = ar^{n-1} \quad S_n = \frac{a(1-r^n)}{1-r} \quad S_n = \frac{a-r\ell}{1-r} \quad S = \frac{a}{1-r} \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Probability and Statistics:

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

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

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

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

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

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

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

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

$$q = 1 - p$$

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

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

$$\mu = np$$

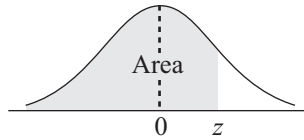
$$\sigma = \sqrt{npq}$$

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

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

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THE STANDARD NORMAL DISTRIBUTION TABLE



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

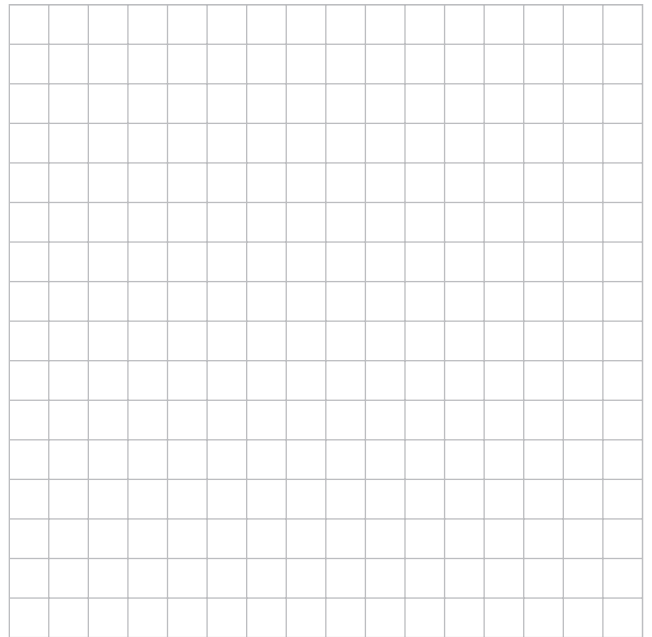
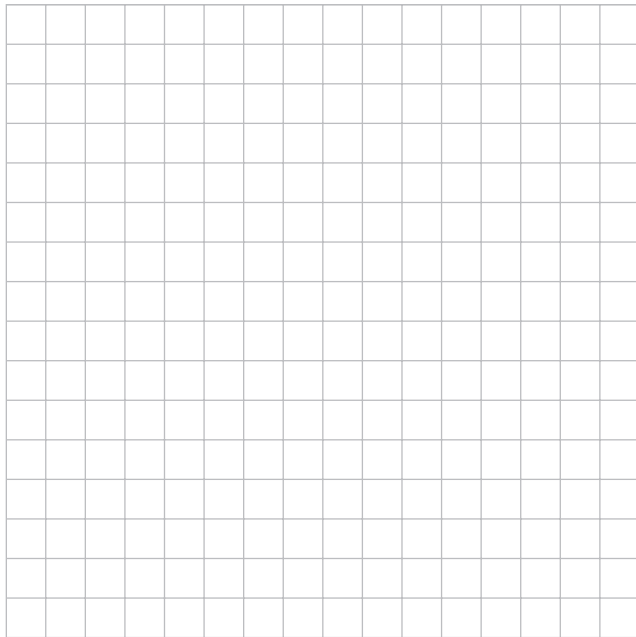
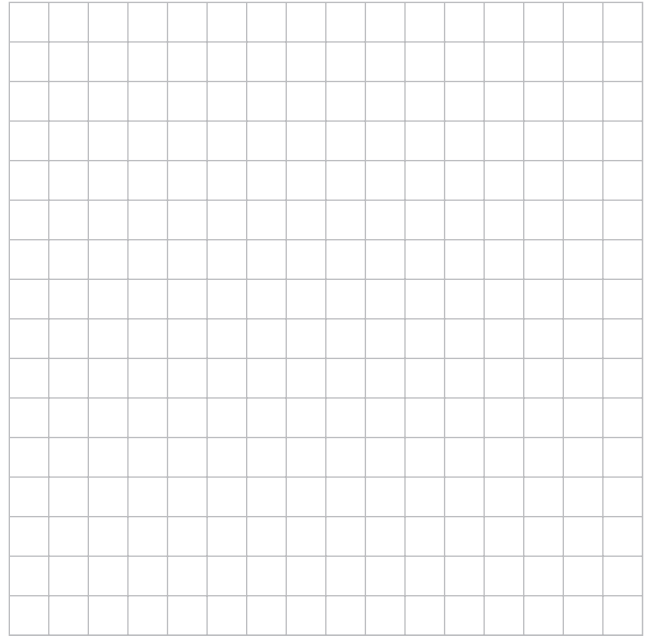
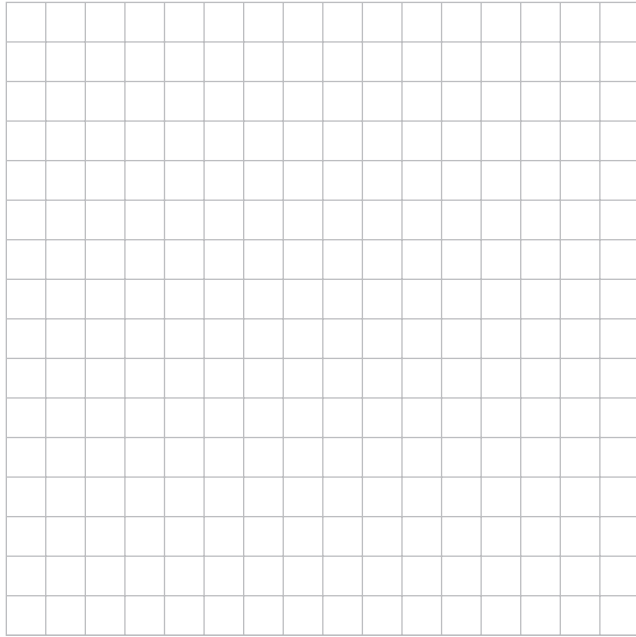
<i>z</i>	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-3.1	0.0010	0.0009	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

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

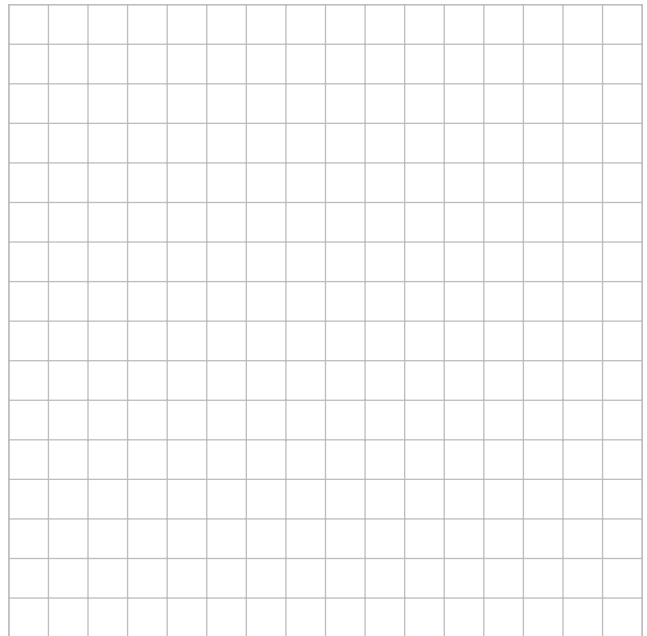
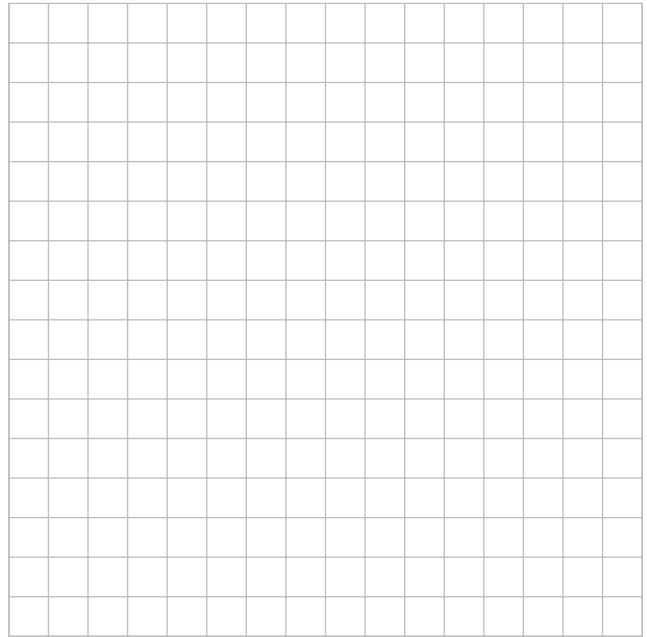
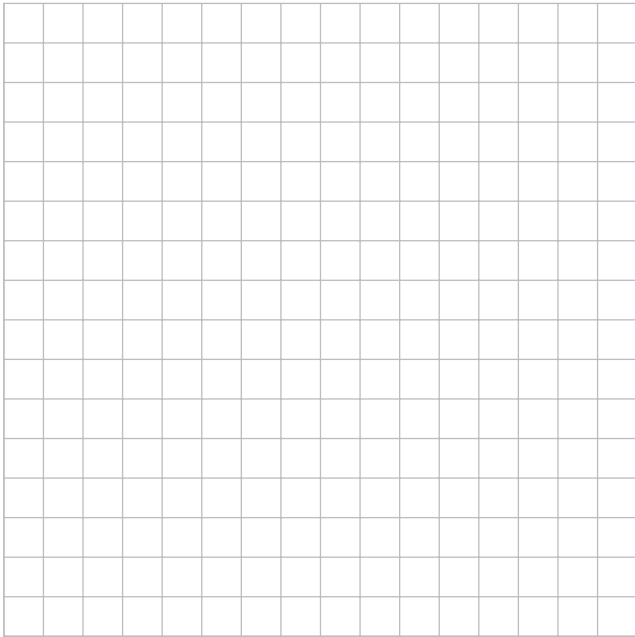
z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	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

(No marks will be given for work done on this page.)



ROUGH WORK FOR GRAPHING
(No marks will be given for work done on this page.)



ROUGH WORK FOR MULTIPLE CHOICE

ROUGH WORK FOR MULTIPLE CHOICE

MINISTRY USE ONLY

MINISTRY USE ONLY

Place Personal Education Number (PEN) here.

Course Code = MA 12
AUGUST 2006

Exam Booklet Form/ Cahier d'examen A B C D E F G H

Student Instructions

1. Place your Personal Education Number (PEN) label at the top of this Booklet. On each of your Answer Sheets (one blue bubble sheet and one white bubble sheet) fill in the bubble (Form A, B, C, D, E, F, G or H) that corresponds to the letter on your Examination Booklet.
2. Use a pencil to fill in bubbles when answering questions on your Answer Sheet.
3. When answering questions in Section I (45 minutes):
 - use the blue answer sheet.
 - calculators are not permitted.
 - you may proceed to other questions that do not require the use of a calculator if you finish this section early. Note: no calculator will be allowed for the first 45 minutes of the examination.
 - you will NOT be able to return to this section after the time limit.
4. When using a calculator:
 - round final answers with decimals to at least two decimal places unless otherwise indicated in the question.
5. Read the Examination Rules on the back of this Booklet.

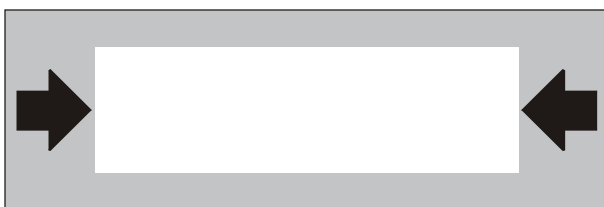
Question 1										
0	1	2	3						(.5) NR	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>	
Question 2										
0	1	2								(.5) NR
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>								<input type="checkbox"/> <input type="checkbox"/>
Question 3										
0	1	2	3	4	5					(.5) NR
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/> <input type="checkbox"/>
Question 4										
0	1	2	3	4	5					(.5) NR
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/> <input type="checkbox"/>
Question 5										
0	1	2	3	4						(.5) NR
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/> <input type="checkbox"/>
Question 6										
0	1	2	3	4	5					(.5) NR
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/> <input type="checkbox"/>



MINISTRY USE ONLY



Place Personal Education Number (PEN) here.



Course Code = MA 12

Principles of Mathematics 12

AUGUST 2006

Response Booklet

PART B: WRITTEN RESPONSE

Value: 24 marks

Suggested Time: 30 minutes

INSTRUCTIONS: Answer the following questions in the space provided in the **Response Booklet**.

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.

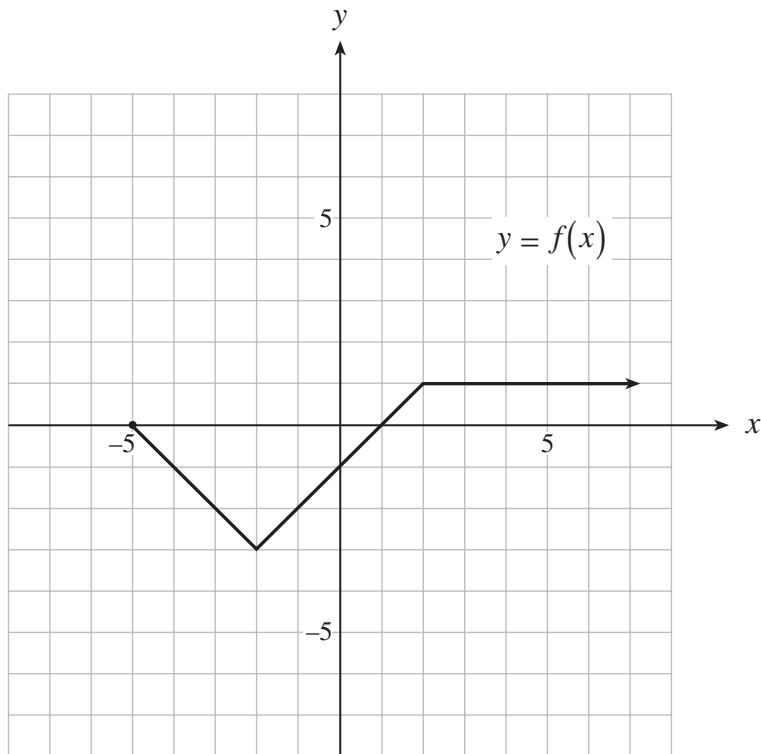
If, in a justification, you refer to information produced by the graphing calculator, this information must be presented clearly in the response. For example, if a graph is used in the solution of the problem it is important to sketch the graph, showing its general shape and indicating the appropriate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

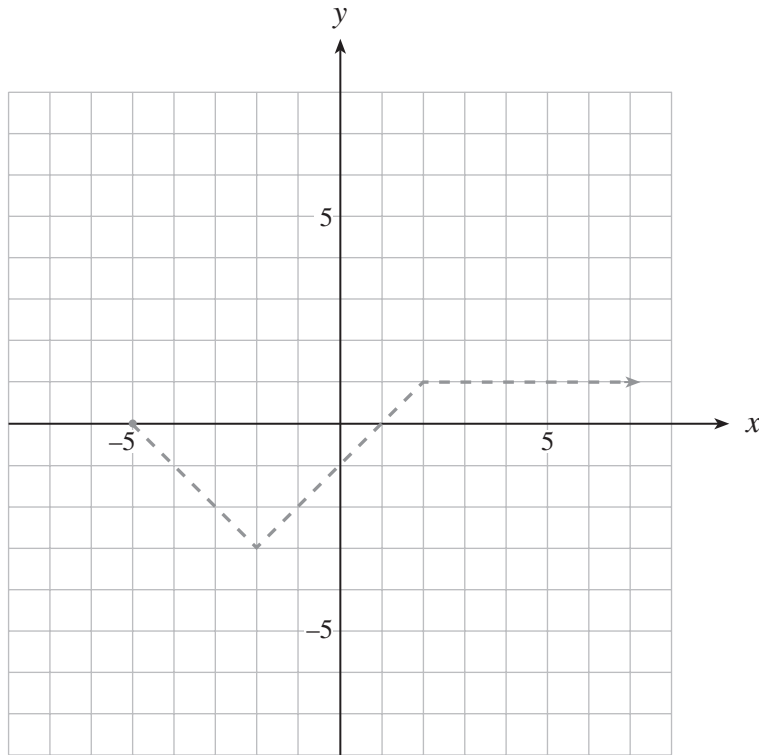
Full marks will NOT be given for the final answer only.

Use the following graph to answer questions 1 and 2.

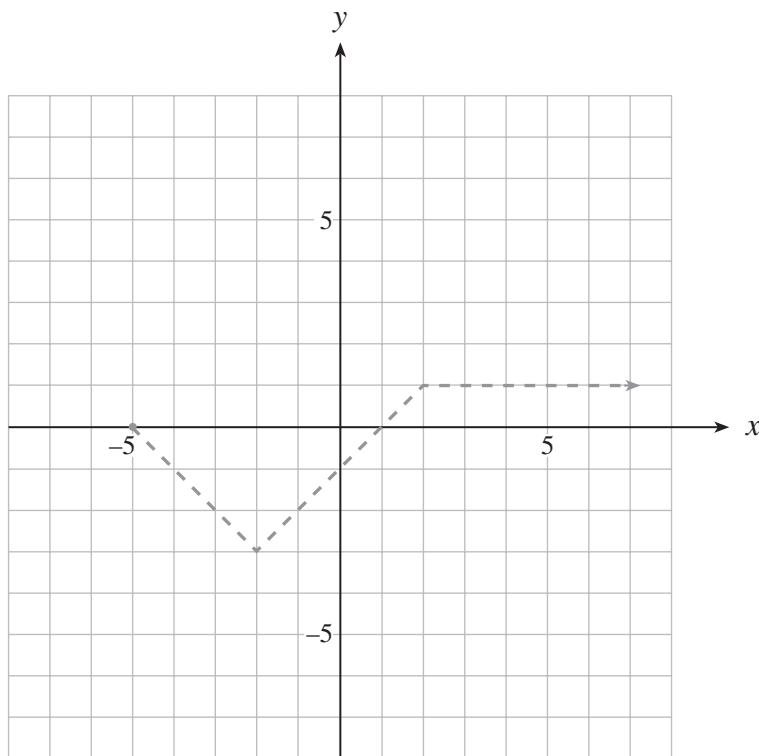
The graph of $y = f(x)$ is shown below.



1. On the grid provided, sketch the graph of $y = 2|f(x)| + 1$. **(3 marks)**



2. On the grid provided, sketch the graph of $y = \frac{1}{f(x)}$. **(2 marks)**



3. A radioactive substance has a half-life of 17 d. How long will it take for 300 g of this substance to decay to 95 g?

(Solve algebraically using logarithms. Answer accurate to at least 2 decimal places.)

(5 marks)

4. It is known that 53% of graduating students are boys. Three grads are chosen at random. Given that at least two of the three grads are boys, determine the probability that all three of the grads are boys.

(Answer accurate to at least 4 decimal places.)

(5 marks)

5. Determine the general solution algebraically. (Solve over the set of real numbers.)

$$3 \cos^2 x - 8 \cos x + 4 = 0$$

(Answer accurate to at least 2 decimal places.)

(4 marks)

6. Prove the identity:

(5 marks)

$$\frac{\tan x(\cos x + \cot x)}{\sec x + \tan x} = \frac{\sin x \sin 2x}{2 - 2\cos^2 x}$$

LEFT SIDE

RIGHT SIDE

END OF EXAMINATION

Examination Rules

1. The time allotted for this examination is two hours.
You may, however, take up to 60 minutes of additional time to finish.
2. Answers entered in the Examination Booklet will not be marked.
3. Cheating on an examination will result in a mark of zero. The Ministry of Education considers cheating to have occurred if a student breaks any of the following rules:
 - Candidates must not give or receive assistance of any kind in answering an examination question during an examination, including allowing one's paper to be viewed by others or copying answers from another student's paper.
 - Candidates must not possess any book, paper or item that might assist in writing an examination, including a dictionary or piece of electronic equipment, that is not specifically authorized for the examination by ministry policy.
 - Candidates must immediately follow the invigilator's order to stop writing at the end of the examination time and must not alter an Examination Booklet, Response Booklet or Answer Sheet after the invigilator has asked students to hand in examination papers.
 - Candidates must not communicate with another student during the examination.
 - Candidates must not remove any piece of the examination materials from the examination room, including work pages.
 - Candidates must not take or knowingly use any secure examination materials prior to the examination session.
4. The use of inappropriate language or content may result in a mark of zero being awarded.
5. Upon completion of the examination, return all examination materials to the supervising invigilator.