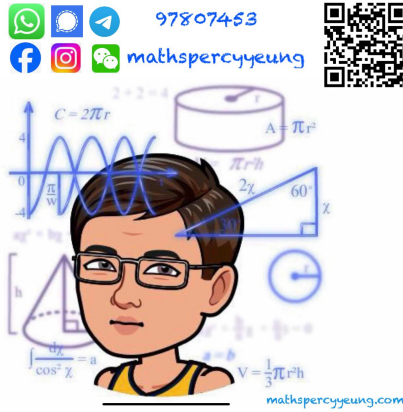


# 2017-2018 F.5 2nd TERM EXAM-MATH-CP 2

17-18 F.5  
2nd TERM EXAM  
MATH CP  
PAPER 2



2017 – 2018  
Form 5 Second Term Examination

## MATHEMATICS Compulsory Part

### PAPER 2

8<sup>th</sup> June, 2018

11:00 am – 12:15 pm (1 hour 15 minutes)

#### INSTRUCTIONS

1. Read carefully the instructions on the Answer Sheet. After the announcement of the start of the examination, you should insert the information required in the spaces provided.
2. When told to open this book, you should check that all the questions are there. Look for the words '**END OF PAPER**' after the last question.
3. All questions carry equal marks.
4. **ANSWER ALL QUESTIONS.** You should use an HB pencil to mark all your answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured.
5. You should mark only **ONE** answer for each question. If you mark more than one answer, you will receive **NO MARKS** for that question.
6. No marks will be deducted for wrong answers.

There are 28 questions in Section A and 17 questions in Section B.

The diagrams in this paper are not necessarily drawn to scale.

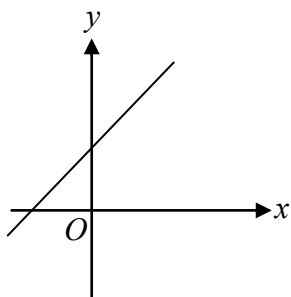
Choose the best answer for each question.

### Section A

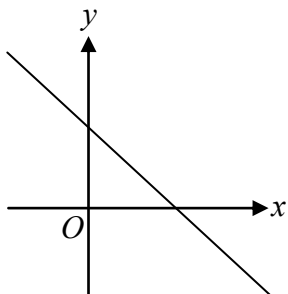
- If  $\sqrt[3]{a\sqrt[3]{a\sqrt[3]{a}}} = a^x$ , then  $x =$ 
  - $\frac{1}{27}$ .
  - $\frac{13}{27}$ .
  - $\frac{4}{9}$ .
  - 3.
- Factorize  $x^2 + a^2 - b^2 - 2ax$ .
  - $(x-a-b)(x+a+b)$
  - $(x-a+b)(x+a-b)$
  - $(x+a-b)(x+a+b)$
  - $(x-a-b)(x-a+b)$
- Find the total surface area of a solid cone with base radius 5 cm and height 12 cm.
  - $60\pi \text{ cm}^2$
  - $85\pi \text{ cm}^2$
  - $90\pi \text{ cm}^2$
  - $169\pi \text{ cm}^2$
- If  $2x^3 + ax^2 + 2x + 3b$  is divisible by  $x+3$ , then  $3a+b =$ 
  - 20.
  - 16.
  - 20.
  - Cannot be determined
- If  $f(x) = x^3 + 2x^2 - x + 5$ , find the remainder when  $f(x-3)$  is divided by  $x-3$ .
  - 0
  - 3
  - 5
  - 7
- If  $f(x) = 1 - x^2$ , then  $f(x+1) - f(x) =$ 
  - 1.
  - $x^2 + 1$ .
  - $x + 2$ .
  - $-(2x+1)$ .
- Which of the following is a rational number?
  - $\sqrt{5} \times \sqrt{20}$
  - $\frac{\pi}{3.14}$
  - $\frac{\sqrt{3}}{4}$
  - $3 - \sqrt{3}$

8. Which of the following may be the graph of  $y = -x + 5$ ?

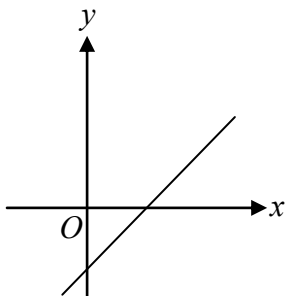
A.



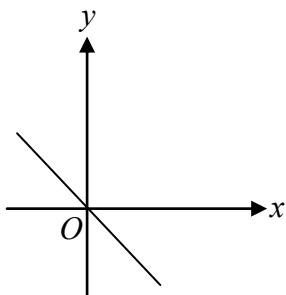
B.



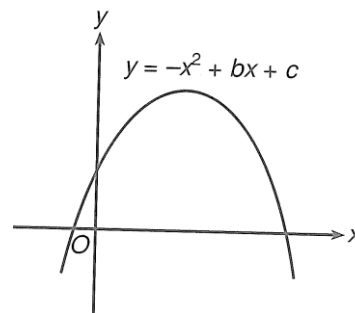
C.



D.



9. The figure shows the graph of  $y = -x^2 + bx + c$ .



A.  $b < 0$  and  $c < 0$

B.  $b < 0$  and  $c > 0$

C.  $b > 0$  and  $c < 0$

D.  $b > 0$  and  $c > 0$

10. The solution of  $-5x > 3 + 2x$  or  $4 + 6x < 0$  is

A.  $x < -\frac{2}{3}$ .

B.  $x < -\frac{3}{7}$ .

C.  $-\frac{2}{3} < x < -\frac{3}{7}$ .

D.  $x < -\frac{2}{3}$  or  $x > -\frac{3}{7}$ .

11. Solve the equation  $(x-3)(x+a) = 2x-6$ .

A.  $x = 2 - a$

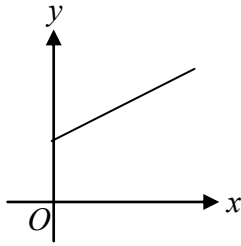
B.  $x = a - 2$

C.  $x = 3$  or  $x = 2 - a$

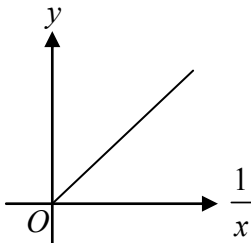
D.  $x = 3$  or  $x = a - 2$

12. Which of the following graphs shows that  $y$  is partly constant and partly varies inversely as  $x$ ?

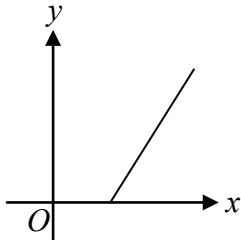
A.



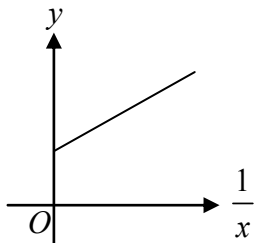
B.



C.



D.



13. If  $p$  varies directly as the square root of  $q$  and inversely as  $r$ , which of the following must be constant?

A.  $p\sqrt{qr}$

B.  $\frac{p\sqrt{q}}{r}$

C.  $\frac{pr}{q^2}$

D.  $\frac{p^2r^2}{q}$

14. It is given that  $p$  varies directly as  $q$  and inversely as the cube of  $r$ . If  $q$  is increased by 10% and  $r$  is increased by 5%, then  $p$  is decreased by

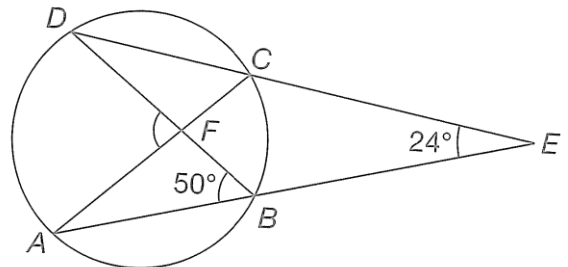
A. 0.23% (corr. to 2 sig. fig.).

B. 5.0% (corr. to 2 sig. fig.).

C. 13% (corr. to 2 sig. fig.).

D. 21% (corr. to 2 sig. fig.).

15. In the figure,  $A, B, C$  and  $D$  are points on the circle,  $ABE, DCE, AFC$  and  $BFD$  are straight lines. If  $\angle ABD = 50^\circ$  and  $\angle AEC = 24^\circ$ , find  $\angle AFD$ .



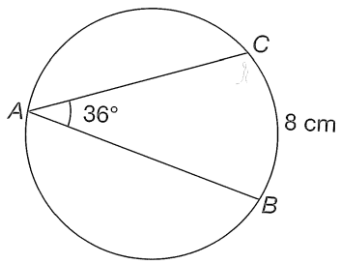
A.  $74^\circ$

B.  $76^\circ$

C.  $82^\circ$

D.  $98^\circ$

16. In the figure,  $ABC$  is a circle,  $\angle BAC = 36^\circ$  and  $BC = 8$  cm. Find the radius of the circle.



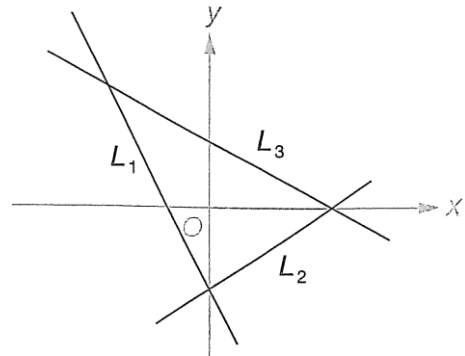
- A. 6 cm  
 B. 9 cm  
 C.  $\frac{20}{\pi}$  cm  
 D.  $\frac{40}{\pi}$  cm
17. For  $0^\circ \leq \theta \leq 360^\circ$ , the greatest value of  $\frac{3 - \cos \theta}{3 + \cos \theta}$  is

- A.  $\frac{1}{2}$ .  
 B. 2.  
 C. 3.  
 D. 4.

18. 
$$\frac{\sin(90^\circ - A)\sin(-A)}{\cos(360^\circ - A)} =$$

- A.  $-\sin A$ .  
 B.  $\sin A$ .  
 C.  $-\frac{\sin^2 A}{\cos A}$ .  
 D.  $\frac{\sin^2 A}{\cos A}$ .

19. The figure shows 3 lines  $L_1$ ,  $L_2$  and  $L_3$  whose slopes are  $m_1$ ,  $m_2$  and  $m_3$  respectively. Which of the following must be true?



- A.  $m_1 < m_2 < m_3$   
 B.  $m_1 < m_3 < m_2$   
 C.  $m_3 < m_2 < m_1$   
 D.  $m_3 < m_1 < m_2$

20. If the lines  $2x + 9y + k = 0$  and  $4x - 3y - 6 = 0$  meet at a point on the  $x$ -axis, find the value of  $k$ .

- A.  $-3$   
 B.  $-2$   
 C.  $2$   
 D.  $3$

21. The equation of a circle is  $x^2 + y^2 + 4x - 8y + 11 = 0$ . Which of the following are true?

- I. The coordinates of the centre of the circle are  $(-2, 4)$ .  
 II. The circumference of the circle is  $6\pi$ .  
 III. The area of the circle is  $9\pi$ .

- A. I and II only  
 B. I and III only  
 C. II and III only  
 D. I, II and III

22. Find the coordinates of the centre of the circle  $4x^2 + 4y^2 - 4x + 8y - 11 = 0$ .

- A.  $(-2, 4)$
- B.  $(-\frac{1}{2}, 1)$
- C.  $(\frac{1}{2}, -1)$
- D.  $(2, -4)$

23. A moving point  $P(x, y)$  is always equidistant from the lines  $L_1: y = x + 5$  and  $L_2: y = x - 3$ . Find the equation of the locus of  $P$ .

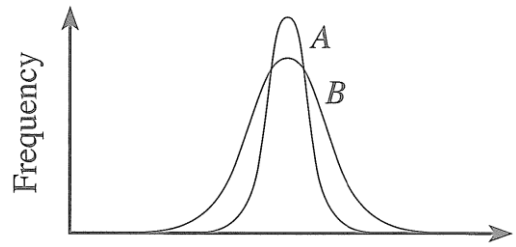
- A.  $y = x + 1$
- B.  $y = x + 2$
- C.  $y = -x + 1$
- D.  $y = -x + 2$

24. The stem-and-leaf diagram below shows the distribution of the heights (in cm) of the students of class 6C. Find the mode, median and range of the distribution.

Stem (tens)	Leaf (units)
15	0 5 9 9
16	0 0 0 1 2 3 3 4 6 6 7 7 7 8 9
17	1 1 2 2 2 5 5 7 7 7 7 9 9
18	0 0 4

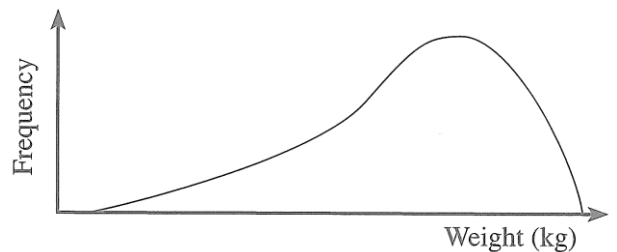
	Mode	Median	Range
A.	7 cm	168 cm	30 cm
B.	7 cm	169 cm	34 cm
C.	177 cm	168 cm	34 cm
D.	177 cm	169 cm	30 cm

25. According to the frequency curves of the two sets of data  $A$  and  $B$ , which of the following must be true?



- I. The mean of  $A$  is equal to that of  $B$ .
  - II. The standard deviation of  $A$  is larger than that of  $B$ .
  - III. The range of  $A$  is smaller than that of  $B$ .
- A. I only
  - B. III only
  - C. I and II only
  - D. II and III only

26. The cumulative frequency curve below shows the distribution of the weights (in kg) of the students in a school.



Which of the following box-and-whisker diagrams may represent the distribution of their weights?

- A.
- B.
- C.
- D.

27. If the point (3, 4) lies outside the circle  $x^2 + y^2 - 6x - ky + 7k + 2 = 0$ , then the range of values of  $k$  is

- A.  $k > 3$ .
- B.  $k < 3$ .
- C.  $k > -3$ .
- D.  $k < -3$ .

**Section B**

28. The imaginary part of  $3i + (2 - i)^2$  is

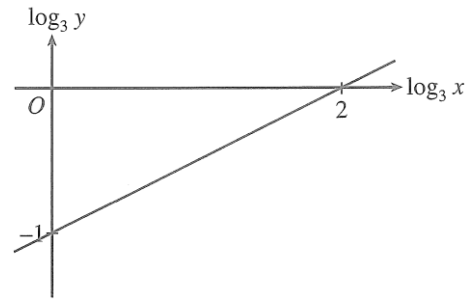
- A.  $-1$ .
- B.  $-i$ .
- C.  $3$ .
- D.  $3i$ .

29. It is given that  $f(x)$  and  $g(x)$  are two polynomials. If the H.C.F. of  $f(x)$  and  $g(x)$  is  $f(x)$ , which of the following must be true?

- I.  $f(x) = g(x)$ .
- II.  $g(x)$  is a multiple of  $f(x)$ .
- III. The L.C.M. of  $f(x)$  and  $g(x)$  is  $g(x)$ .

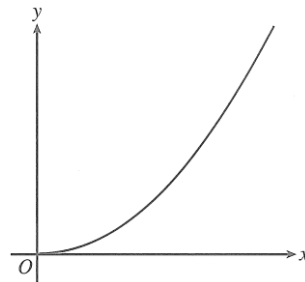
- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

30. The graph of the figure shows the linear relation between  $\log_3 x$  and  $\log_3 y$ .

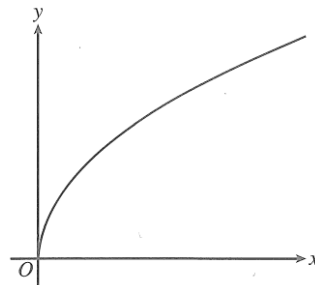


Which of the following graph may represent the relation between  $x$  and  $y$ ?

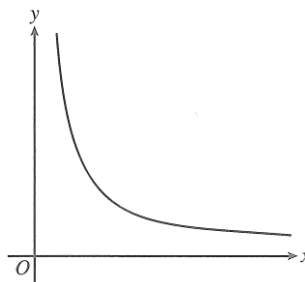
A.



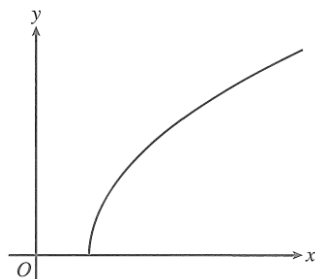
B.



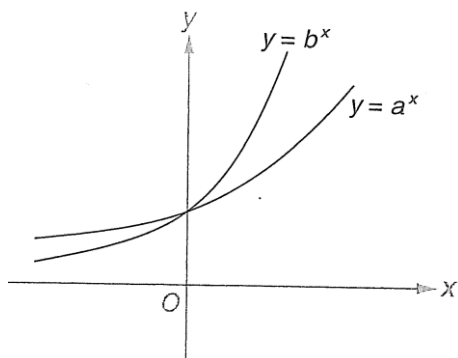
C.



D.



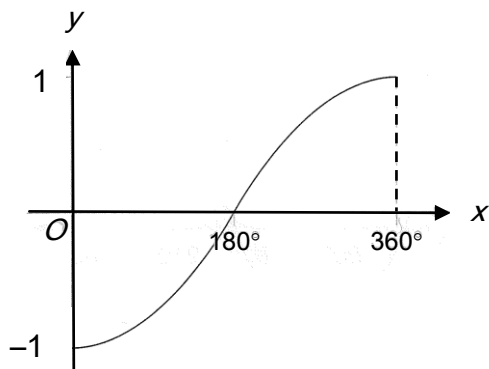
31. The figure shows the graphs of  $y = a^x$  and  $y = b^x$ , where  $a$  and  $b$  are constants. Which of the following must be true?



- I.  $a > b$ .  
 II.  $b > 1$ .  
 III. The two graphs intersect at  $(0, 1)$ .

- A. I and II only  
 B. I and III only  
 C. II and III only  
 D. I, II and III

32. The equation of the graph in the figure may be

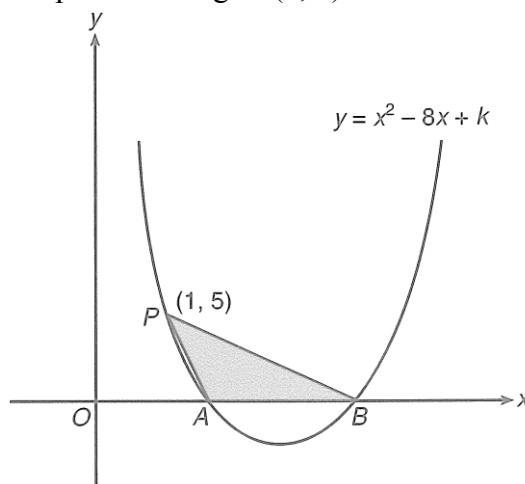


- A.  $y = -\cos \frac{x}{2}$ .  
 B.  $y = -\cos x$ .  
 C.  $y = -\cos 2x$ .  
 D.  $y = -\frac{1}{2} \cos x$ .

33. Find the number of solutions of the equation  $2\sin^2 x + \cos x + 1 = 0$  for  $0^\circ \leq x \leq 360^\circ$ .

- A. 1  
 B. 2  
 C. 3  
 D. 4

34. The quadratic graph of  $y = x^2 - 8x + k$  cuts the  $x$ -axis at points  $A$  and  $B$ . The graph also passes through  $P(1, 5)$ .



Find the area of  $\triangle PAB$ .

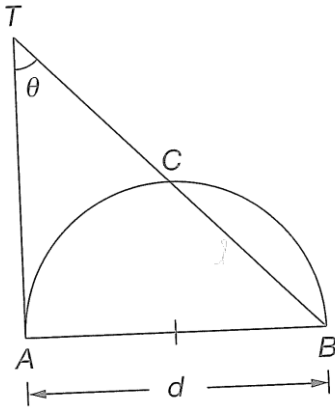
- A. 10 sq. units  
 B. 15 sq. units  
 C. 16 sq. units  
 D. 24 sq. units

35. If  $\alpha$  and  $\beta$  are unequal numbers such that  $\alpha^2 + 5\alpha = 4$  and  $\beta^2 + 5\beta = 4$ , then  $(\alpha + 2)(\beta + 2) =$

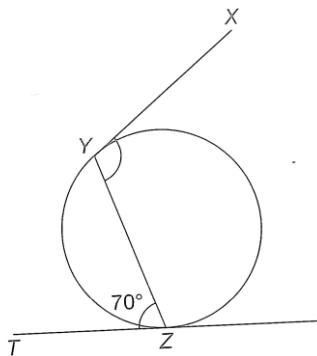
- A. -10.  
 B. -2.  
 C. 2.  
 D. 10.



36. In the figure,  $ACB$  is a semicircle,  $AB = d$ ,  $\angle TAB = 90^\circ$  and  $\angle ATC = \theta$ . Find  $TC$ .

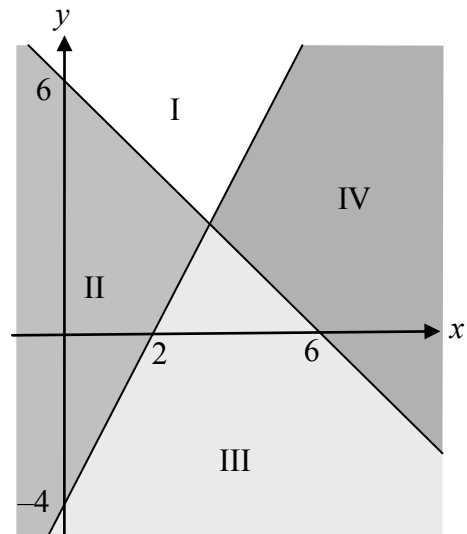


- A.  $d \cos \theta \tan \theta$   
 B.  $d \sin \theta \tan \theta$   
 C.  $\frac{d \sin \theta}{\tan \theta}$   
 D.  $\frac{d \cos \theta}{\tan \theta}$
37. In the figure,  $XY$  and  $ZT$  are the tangents to the circle at  $Y$  and  $Z$  respectively. Find  $\angle XYZ$ .

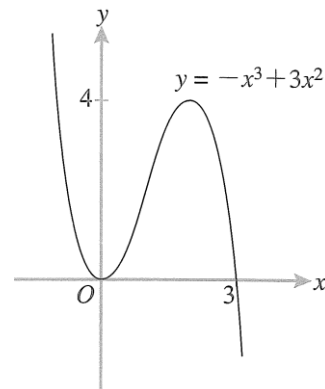


- A.  $110^\circ$   
 B.  $125^\circ$   
 C.  $130^\circ$   
 D.  $145^\circ$
38. If the circle  $x^2 + y^2 + Dx + 4y + 9 = 0$  touches the  $x$ -axis, then  $D =$
- A.  $\pm 1$ .  
 B.  $\pm 3$ .  
 C.  $\pm 5$ .  
 D.  $\pm 6$ .

39. Which of the regions in the figure represents the solution of  $\begin{cases} x + y \leq 6 \\ 2x - y \geq 4 \end{cases}$  ?



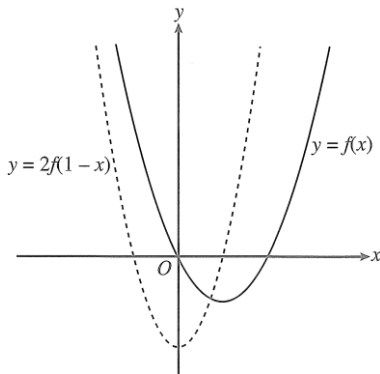
- A. Region I  
 B. Region II  
 C. Region III  
 D. Region IV
40. The figure shows the graph of  $y = -x^3 + 3x^2$ . Using the following figure, which of the following has/have only one real solution?



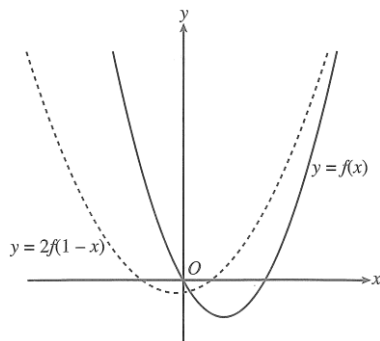
- I.  $x^3 - 3x^2 = 0$   
 II.  $x^3 - 3x^2 + 2 = 0$   
 III.  $x^3 - 3x^2 - 3 = 0$
- A. II only  
 B. III only  
 C. I and II only  
 D. I and III only

41. Which of the following may represent the graphs of  $y = f(x)$  and  $y = 2f(1-x)$  on the same rectangular coordinate plane?

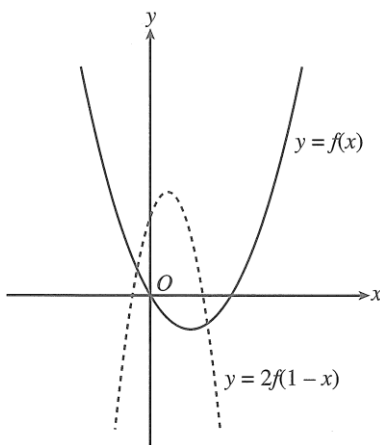
A.



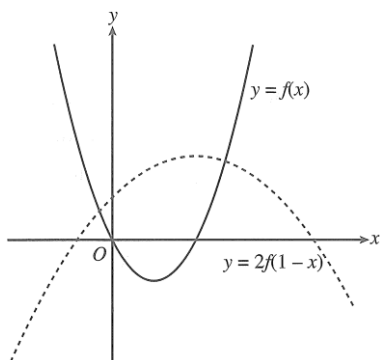
B.



C.



D.



42. A working group of 6 persons is to be chosen from 5 technicians and 3 engineers. If there must be more technicians than engineers in the working group, in how many ways can the group be chosen?

- A. 10
- B. 15
- C. 18
- D. 28

43. The probabilities that John will pass in Physics and Chemistry tests are  $p$  and  $\frac{3}{4}$  respectively. If the probability that he will pass in at least one of the subjects is  $\frac{9}{10}$ , find  $p$ .

- A.  $\frac{3}{5}$
- B.  $\frac{2}{5}$
- C.  $\frac{1}{5}$
- D.  $\frac{3}{20}$

44. Three letters are selected at random from the word "PLATINUM" to form a string. Find the probability that the string has a vowel in the middle.

- A.  $\frac{1}{16}$
- B.  $\frac{1}{8}$
- C.  $\frac{3}{16}$
- D.  $\frac{3}{8}$

45. If 3 boys and 5 girls are seated randomly in a queue, find the probability that the five girls sit next to each other in the queue.

- A.  $\frac{1}{7}$
- B.  $\frac{1}{8}$
- C.  $\frac{5}{8}$
- D.  $\frac{1}{14}$

**End of Paper**