

TMUA Mock Paper 1 (Paper 2)

20 questions. Recreated from the publicly available paper.

Question 1

An arithmetic sequence has first term 5 and common difference 3. What is the sum of its first 20 terms?

A.670

B.640

C.1340

D.335

E.610

Question 2

Find the equation of the normal to the curve $y = x^2 - 3x$ at the point where $x = 2$.

A. $y = x - 4$

B. $y = -x + 4$

C. $y = -x$

D. $y = x$

E. $y = -x - 4$

Question 3

A fair six-sided die is rolled three times. What is the probability that the three numbers obtained are strictly increasing?

A. $\frac{1}{6}$

B. $\frac{5}{54}$

C. $\frac{5}{108}$

D. $\frac{1}{36}$

E. $\frac{7}{27}$

Question 4

An open-topped box is made from a square sheet of card of side 12 cm by cutting a square of side x cm from each corner and folding up the sides. Which value of x gives the maximum volume?

A.3

B.4

C.2

D.6

E.1

Question 5

How many positive integers are divisors of 720?

A.30

B.24

C.15

D.20

E.36

Question 6

Two circles have equations $x^2 + y^2 = 4$ and $(x - 6)^2 + (y - 8)^2 = 9$. Find the shortest distance between them.

A.10

B.15

C.3

D.5

E.2

Question 7

Find the term independent of x in the expansion of $\left(2x - \frac{1}{x^2}\right)^6$.

A. -240

B. 60

C. 240

D. 160

E. 15

Question 8

A sequence is defined by $u_1 = 1$ and $u_{n+1} = \frac{6}{u_n + 1}$. Given that it converges, find its limit.

A. -3

B. 2

C. 3

D. 6

E. 1

Question 9

What is the maximum value of $f(x) = 3 \sin x + 4 \cos x$?

A.7

B.5

C.25

D. $\sqrt{7}$

E.12

Question 10

The line $y = kx - 2$ is a tangent to the curve $y = x^2 - 3x + 2$ for two values of k . Find the sum of those two values.

A. -7

B. 6

C. 8

D. -6

E. -8

Question 11

The graph of $y = \sqrt{x}$ is transformed, in order, first by a translation of 3 in the positive x -direction and then by a stretch of scale factor 2 parallel to the y -axis. What is the equation of the resulting graph?

A. $y = 2\sqrt{x} - 3$

B. $y = \sqrt{2x - 3}$

C. $y = 2\sqrt{x + 3}$

D. $y = 2\sqrt{x - 3}$

E. $y = \sqrt{2(x - 3)}$

Question 12

The cubic $f(x) = x^3 + ax^2 + bx - 6$ has both $(x - 1)$ and $(x - 2)$ as factors. What is its third root?

A. -3

B. 6

C. 1

D. -6

E. 3

Question 13

Which of the following is the largest?

A. $2^{1/2}$

B. $3^{1/3}$

C. $6^{1/6}$

D. they are all equal

E. none is larger than the others

Question 14

Given that $\sin \theta + \cos \theta = \frac{1}{2}$, find the value of $\sin \theta \cos \theta$.

A. $\frac{3}{8}$

B. $-\frac{1}{8}$

C. $-\frac{3}{8}$

D. $\frac{1}{4}$

E. $-\frac{3}{4}$

Question 15

Evaluate $\int_0^3 \lfloor x \rfloor dx$, where $\lfloor x \rfloor$ denotes the greatest integer not exceeding x .

A.4.5

B.6

C.3

D.2

E.9

Question 16

Solve $\log_2 x + \log_2(x - 2) = 3$ for $x > 2$.

A. -2

B. 4

C. 8

D. 2

E. 6

Question 17

The sum of the first n terms of a sequence is $S_n = n^2 + 2n$. Find the tenth term of the sequence.

A.21

B.120

C.19

D.23

E.39

Question 18

The points $(1, 2)$ and $(5, 8)$ are the endpoints of a diameter of a circle. Find the radius of the circle.

A. $\sqrt{52}$

B. $\sqrt{26}$

C. $\sqrt{13}$

D. 13

E. $2\sqrt{13}$

Question 19

In how many ways can 8 identical balls be placed into 3 distinct boxes so that no box is empty?

A.28

B.21

C.15

D.45

E.36

Question 20

How many ordered pairs of positive integers (x, y) satisfy $\frac{1}{x} + \frac{1}{y} = \frac{1}{6}$?

- A.9
- B.5
- C.8
- D.10
- E.18

Answer key

1. Answer: A
2. Answer: C
3. Answer: B
4. Answer: C
5. Answer: A
6. Answer: D
7. Answer: C
8. Answer: B
9. Answer: B
10. Answer: D
11. Answer: D
12. Answer: E
13. Answer: B
14. Answer: C
15. Answer: C
16. Answer: B
17. Answer: A
18. Answer: C
19. Answer: B
20. Answer: A

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