

1. $\sqrt{-25} =$

A. $\pm 25i$

☒ B. $\pm 5i$

C. $5i$

D. i

2. $\sum_{n=1}^5 i^n =$

A. $-i$

☒ B. i

C. 1

D. 5

3. The sequence $\langle a_n \rangle = \frac{20-3n}{n+4}$ converges to

A. 20

B. 4

☒ C. -3

D. -4

4. A term in the expansion of $\left(3x^2 - \frac{1}{x}\right)^{12}$ is $\binom{12}{k}(3x^2)^{12-k}\left(\frac{-1}{x}\right)^k$

The value of k for the constant term is

A. 2

B. 3

☒ C. 8

D. 12

5. The average of the two positive integers m and n is 100. The largest possible value of n is

A. 99

B. 100

C. 198

☒ D. 199

6. The coordinates of the point of inflection of $y = (x-1)^3(x-3)^2$ which lies on the x -axis is

☒ A. $(1,0)$

B. $(2,0)$

C. $(3,0)$

D. $(6,0)$

7. The function $y = |x-1|$ is not differentiable at the point

A. $(0,0)$

☒ B. $(1,0)$

C. $(0,1)$

D. $(1,1)$

8. What is the minimum value of $y = 3\sin x - 4\cos x$?

A. -1

B. -3

☒ C. -5

D. -7

9. The smallest positive value of θ at which the function $y = 12\sin(\theta + 30^\circ)$ is maximum is

A. $\theta = 30^\circ$

☒ B. $\theta = 60^\circ$

C. $\theta = 90^\circ$

D. $\theta = 150^\circ$

10. The equation of the horizontal asymptote of bottom heavy functions is

A. $x = 0$

B. $x = 1$

☒ C. $y = 0$

D. $y = 1$

11. If Goundar rolls a pair of standard 6-sided fair dice, what is the probability that the sum of the two numbers he rolls is a power of 2?

- ☒ A. 0.25 B. 0.5 C. 0.75 D. 1

12. In a certain population, it is found that 25% can roll their tongue. The probability that in a random sample of 15, exactly 6 will be able to roll their tongues is

- ☒ A. $\binom{15}{6}(0.25)^6(0.75)^9$ B. $\binom{15}{6}(0.25)^9(0.75)^6$ C. $(0.25)^6(0.75)^9$ D. 1

13. The function $y = \frac{x^2 - 9}{x - 3}$ is discontinuous at

- A. $(3, \infty)$ B. $(3, 0)$ ☒ C. $(3, 6)$ D. $x = \pm 3$

14. The range of the function $y = 3 + \sin x$ is

- ☒ A. $2 \leq y \leq 4$ B. $1 \leq y \leq 3$ C. $2 \leq y \leq 3$ D. $1 \leq y \leq 4$

Use the following information to answer questions 15 and 16.

A particle moves s metres in t seconds where $s = 3t^2 - 4t + 10$

15. The initial displacement is

- A. 3 m B. 4 m C. 7 m ☒ D. 10 m

16. The acceleration when $t = 3$ s is

- A. 3 m/s^2 B. 4 m/s^2 ☒ C. 6 m/s^2 D. 10 m/s^2

17. For the function $y^2 = 2x$, $\frac{dy}{dx}$ equals

- ☒ A. y^{-1} B. 2 C. y D. y^{-2}

18. For the function $f(x)$, $f''(x) = -2x$. The function $f(x)$ is concave up in the interval

- A. $x \leq 0$ ☒ B. $x < 0$ C. $x > 0$ D. $x \geq 0$

19. The area enclosed by the line $y = x$ and the function $y = x^3$ in quadrant 1 is equal to

☒ A. 0.25

B. 0.5

C. 0.75

D. 1.25

20. If $y = e^3$ then $\frac{dy}{dx}$ equals

A. e^3

B. $3e^2$

C. e^2

☒ D. 0

21. The domain of $y = \sin^{-1} x$ is

☒ A. $-1 \leq x \leq 1$

B. $-1 < x < 1$

C. $-1 < x \leq 1$

D. Real numbers

22. If $f(x) = x$ and $g(x) = 2x$ then $f \circ g(x) =$

A. x

☒ B. $2x$

C. $3x$

D. 0

23. A cube of volume 512 cm^3 is painted and is then cut into cubes with volume 1 cm^3 .
How many small cubes have no faces painted?

A. 125

☒ B. 216

C. 343

D. 512

24. If $\int 3e^2 dx$ equals

A. $3e^2 + c$

B. $e^3 + c$

☒ C. $3e^2 x + c$

D. x

25. In how many ways can 6 students be split up into 2 equal teams?

☒ A. 10

B. 12

C. 15

D. 20

26. $\sec^{-1}(2) =$

A. 45°

☒ B. 60°

C. 90°

D. 180°

27. $\sin^{-1} x + \cos^{-1} x =$

A. 45°

B. 60°

☒ C. 90°

D. 180°

28. What is the size of the acute angle between the hour and minute hands of a clock at 3:26?

☒ A. 53°

B. 60°

C. 61°

D. 66°

29. The value of $\lim_{x \rightarrow 0} \frac{\sin 2x}{x}$ is

A. 0

B.1

☒ C. 2

D. Undefined

30. An object moves s metres in t seconds where $s = 3 \sin 4t$. The maximum velocity is

A. 3 m/s

B. 4 m/s

C. 7 m/s

☒ D. 12 m/s