Unity Academy Secondary School - Keranyo Branch

Math Review questions for Grade 12

Instruction: Choose the correct answer from the given alternatives

1. If the truth value of the compound proposition $\neg p \Rightarrow (q \vee \neg r)$ is false, then what is the truth value of p, q and r respectively ?

   A. T, F, F B. F, T, F C. T, T, F D. F, F, F

2. Which one of the following compound proposition is equivalent with $\neg p \vee q$?

   A. $p \Leftrightarrow q$ B. $\neg p \Rightarrow \neg q$ C. $\neg q \Rightarrow \neg p$ D. $q \Rightarrow p$

3. The variance of 20 observation is 5. If each observation is multiplied by 2, then what is the variance of the resulting observations?

   A. 40 B. 20 C. 10 D. 5

4. How many permutations are there of the letters in the word PARALLEL?

   A. 3360 B. 2730 C. 5468 D. 4126

5. From a pack of 52 playing cards, one card is drawn. What is the probability that it is either a Queen or red?

   A. $\frac{7}{13}$ B. $\frac{30}{52}$ C. $\frac{1}{2}$ D. $\frac{24}{52}$

6. How many four – digit numbers can be formed from the digits 2, 3, 5, 7, 8 and 9 if each digit is used once only?

   A. 360 B. 120 C. 480 D. 720

7. If the truth value of $(\neg p \Rightarrow q)$ $\neg r$ is False, then which of the following compound propositions has a truth value T?

   A. $\neg r \wedge q$ B. $\neg q \Rightarrow p$ C. $r \Leftrightarrow \neg p$ D. $p \vee \neg q$

8. Which one of the following argument forms is valid?

   A. $p, p \Rightarrow q | \neg q$ B. $q, \neg p \Rightarrow \neg q | \neg p$ C. $p \vee q, p | q$ D. $\neg q, p \Rightarrow q | \neg p$

9. What is the area of the region enclosed by the graphs of $f(x) = 3x^2 - 12$ and $g(x) = 4 - x^2$?

   A. $\frac{112}{3} sq\ unit$ B. 64 sq unit C. $\frac{256}{5}$ sq unit D. $\frac{128}{3}$ sq unit

10. What is the volume of the solid generated by revolving the region bounded by the line $y = -x + 1$ and the $x-axis$ between $x = -2 \wedge x = 1$ *about the* $x-axis$?

    A. $\frac{8}{3}\pi$ B. 9π C. $\frac{25}{3}\pi$ D. 12π

11. $\int_0^2 \frac{x^2}{\sqrt{x^3+1}}dx =$ _____.

A. $5\sqrt{3}$ B. $\frac{9}{2}$ C. $\frac{4}{3}$ D. $\frac{17}{6}$

12. $\int_{-1}^{1} \frac{e^x}{1+e^x}dx$ is equal to

A. $\ln(1+e)$ B. $1+\frac{1}{e}$ C. $3e^{-2}$ D. 1

13. $\int_{\frac{\pi}{2}}^{\pi} \sin x\,dx$ = _____

A. $\pi-1$ B. 2π C. $\pi+1$ D. $\frac{\pi}{2}+\frac{\sqrt{2}}{2}$

14. There are 4 black, 2 red and 4 white balls in a box. If three balls are selected at random what is the probability that all the balls selected are black?

A. $\frac{1}{30}$ B. $\frac{5}{33}$ C. $\frac{1}{12}$ D. $\frac{2}{15}$

15. Two dice are thrown simultaneously. What is the probability that the sum of the numbers scored is 5?

A. $\frac{1}{9}$ B. $\frac{3}{10}$ C. $\frac{1}{6}$ D. $\frac{5}{36}$

Use the Frequency Distribution Table below to answer questions 16 and 17

Score	Number of students (f)
5 – 14	4
15 - 24	12
25 - 34	10
35 - 44	6
45 - 54	2

16. The mean score of the distribution is

A. 26.56 B. 27.25 C. 25.75 D. 28.34

17. What is the mode of the distribution?

A. 22.5 B. 23.75 C. 21.5 D. 20.75

18. If $\begin{pmatrix} b & -1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} 2 & 1 \\ 4 & 1 \end{pmatrix} = \begin{pmatrix} a & a \\ 2 & 1 \end{pmatrix}$, then the values of a and b are

A. $a=-1, b=0$ C. $a=2, b=3$

B. $a=5, b=4$ D. $a=1, b=-2$

19. If $(x+yi)+2(3x-y)+4i=0$, then the values of x and y are

A. $x=\frac{-4}{3}, y=7$ C. $x=-11, y=8$

B. $x=\frac{-8}{7}, y=-4$ D. $x=2, y=\frac{-5}{3}$

20. Let $A=\begin{pmatrix}1 & 2 & 3\\ 0 & 1 & 4\end{pmatrix}$ and $B=\begin{pmatrix}1 & 0\\ 1 & 3\\ 2 & 0\end{pmatrix}$, then $(AB)^T$ = _____.

A. $\begin{pmatrix}9 & 6\\ 9 & 3\end{pmatrix}$ C. $\begin{pmatrix}6 & 3\\ 9 & 9\end{pmatrix}$

B. $\begin{pmatrix}6 & 9\\ 3 & 9\end{pmatrix}$ D. $\begin{pmatrix}9 & 9\\ 6 & 3\end{pmatrix}$

21. If the matrix $A=\begin{pmatrix}1 & 3 & 3\\ 0 & 2 & -1\\ 2 & 1 & 2\end{pmatrix}$, then $\det(A)$ is equal to

A. -21 B. 17 C. -13 D. 26

22. What is the solution set of the equation $x^2+2x+5=0$?

A. C. $\{-1-2i,\ -1+2i\}$

B. $\{-1-\sqrt{3}i\ ,\ -1+\sqrt{3}i\ \}$ D. $\left\{\frac{-i}{3}, \frac{i}{3}\right\}$

23. If $Z=¿$, then $|Z|$ = _____

A. $\frac{2}{5\sqrt{53}}$ B. $\frac{8}{3\sqrt{14}}$ C. $\frac{4}{5\sqrt{53}}$ D. $\frac{16}{3\sqrt{14}}$

24. For what values of k the matrix $A=\begin{pmatrix}3-k & 6\\ 2 & 4-k\end{pmatrix}$ is singular?

A. $k=-2 \vee k=5$ C. $k=0 \vee k=7$

B. $k=3 \vee k=4$ D. $k=-1 \vee k=6$

25. What is the solution set of the system of equations $\begin{cases} x-2y+z=7\\ 3x+y-z=2\\ 2x+3y+2z=7\end{cases}$?

A. $\{(1,0,6)\}$ B. $\{(-1,4,16)\}$ C. $\{(2,-1,3)\}$ D. $\{(5,1,4)\}$

26. If $Z=1+\frac{¿}{1+i}¿$, then which one of the following is the polar representation of Z?

A. $Z=\sqrt{2}¿$ C. $Z=2\sqrt{2}¿$

B. $Z=4¿$ D. $Z=4¿$

27. For what value of k does the following system of equations have no solution?

$\begin{cases} x+2y-z=12\\ 2x-y-2z=2\\ x-3y+kz=11\end{cases}$?

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

28. The solution set of $Z^3+8=0$ is

A. $\{2,-1-\sqrt{3}i,-1+\sqrt{3}i\}$ C. $\{-2,1-\sqrt{3}i,1+\sqrt{3}i\}$

B. $\{-1,-2\sqrt{3}i,2\sqrt{3}i\}$ D. $\{-2,-\sqrt{3}i,\sqrt{3}i\}$

29. A committee of 6 students has to be formed from 7 boys and 5 girls. In how many ways can this be done when the committee contains 4 boys and 2 girls?

A. 720 ways B.656 ways C. 480 ways D.350 ways

30. A bag contains 4 red balls, 5 blue balls, and 3 white balls. Two balls are drawn one after the other without replacement. What is the probability that both are white?

A. $\frac{1}{4}$ B. $\frac{5}{33}$ C. $\frac{3}{26}$ D. $\frac{1}{22}$

31. Let $f(x)=x^4-6x^2+1$ on $[-2,3]$ be given, than a local minimum value of f is equal to

A. -7 B. -8 C. 28 D. -12

32. The graph of $f(x)=4x^3-12x^2+5$ has an inflection point at

A. (0, 5) B. (1, -3) C. (-1, -11) D. (2, -11)

33. Let $f(x)=3x^2+3x+1$, *then* f is concave upward on

A. (0, 1) B. (-∞ , 1¿ C. (1, ∞¿ D. (-3, 1)

34. $\int x^3\log_5 x\,dx=$ _____

A. C. $\ln 5\left[\frac{x^3}{3}\ln x-\frac{x^3}{9}\right]+c$

B. $\ln 5\left[\frac{x^4}{25}\ln x+\frac{x^4}{9}\right]+c$ D. $\frac{1}{\ln 5}\left[\frac{x^4}{4}\ln x-\frac{x^4}{16}\right]+c$

35. If $y=\ln\left(\frac{x}{\sqrt{x+4}}\right)$, then $\frac{d^2y}{dx^2}$ is equal to

A. $\frac{-1}{x^2}+\frac{2}{(2x+8)^2}$ C. $-x^2+\frac{3}{4(2x+8)^2}$

B. $\frac{-1}{x^2}+\frac{4}{(x+4)^2}$ D. $-x^2+\frac{1}{4(x+4)^2}$

36. If $G(x)=f(x^2+x)$, $f'(2)=-2$ and $f''(2)=3$, then $G''(1)$ is equal to

A. -18 B. 23 C. 9 D. 27

37. Let $f(x)=x^3e^{-x}$, then $f''(1)=$_____

A. $6e^{-1}$ B. $-3e^{-1}$ C. e^{-1} D. $\frac{1}{2}e^{-1}$

38. For the function $f(x)=x^4-\frac{16}{3}x^3+6x^2$, the critical numbers are

A. $-1\wedge-2$ C. -3, -1 and $\frac{1}{2}$

B. 2, 4 and 5 D. 0, 1 and 3

39. For the function $f(x)=x^3-12x-5$, f is strictly decreasing on

A. $(-\infty,-2]$ and $[2,\infty)$ C. $(-\infty,-1]$ and $[3,\infty)$

B. $[-2,2]$ D. $[-1,3]$

40. $\int 2^x\sqrt{1+2^x}dx$ is equal to

A. $\frac{2\ln 2}{3}(1+2^x)+c$ C. $\frac{3}{2\ln 2}\left(\sqrt{1+2^x}\right)^3+c$

B. $\frac{2}{3\ln 2}(1+2^x)^{\frac{3}{2}}+c$ D. $3\ln 2(1+2^x)^3+c$

41. Let $P(x)\equiv x>4\wedge Q(x)\equiv x$ is an odd numbers, then which one of the following statements has a truth value F ?

A. $(\ni x)P(x)$ C. $(\forall x)\ [P(x)Q(x)]$

B. $(\ni x)[P(x)Q(x)]$ D. $(\exists x)\ [P(x)Q(x)]$

42. In how many ways can kebede invite at least one of his friends out of 6 friends to an art exhibition?

A. 75 ways B. 41ways C. 63 ways D. 56 ways

43. In an experiment of tossing three coins at a time. What is the probability of getting two heads?

A. $\frac{5}{8}$ B. $\frac{1}{4}$ C. $\frac{3}{8}$ D. $\frac{7}{8}$

44. If the coefficient of x in the expansion of $\left(x^2+\frac{k}{x}\right)^5$ is 270, then what is the value of k?

A. -4 B. 7 C. 3D. -5

45. What is the constant term in the expansion of $\left(x^2-\frac{1}{x}\right)$?

A. 120 B. 66 C. 84 D. 92

46. For the matrix $A=\begin{pmatrix}-3 & 4 & -7\\ 1 & 2 & 0\\ -4 & 8 & 11\end{pmatrix}$, the minor of a $_{23}$ is equal to

A. -61 B. 16 C. 22 D. -8

47. If $A=\begin{pmatrix}-3 & 5\\ -2 & 4\end{pmatrix}$,then $adj(A)=$¿¿

A. $\begin{pmatrix}-3 & -2\\ 5 & 4\end{pmatrix}$ B. $\begin{pmatrix}5 & -3\\ 4 & 2\end{pmatrix}$ C. $\begin{pmatrix}4 & 2\\ -3 & 5\end{pmatrix}$ D. $\begin{pmatrix}4 & -5\\ 2 & -3\end{pmatrix}$

48. The simplified from of $Z=\frac{(1-3i)(5+i)}{1+i}$ is

A. $3-2i$ B. $\frac{3}{2}+\frac{5}{2}i$ C. $-3-11i$

D. $3\sqrt{2}i$

49. If$Z=x+yi$, then when the equation $Z(1+3i)-4i=Z$ is solved, what are the values of $x$and $y$respectively?

A. 0, 4 B. $\frac{4}{3}$, 0 C. 3, 1

D. $\frac{2}{3}$, $\frac{1}{3}$

50. The principal argument of the complex number$Z=3\sqrt{3}+3i$ is

A. $\frac{\pi}{6}$ B. $\frac{\pi}{4}$ C. $\frac{\pi}{3}$

D. $\frac{\pi}{2}$

51. If $\begin{pmatrix}x & -3\\ -1 & y\end{pmatrix}$ is the inverse of $\begin{pmatrix}-1 & 3\\ 1 & -4\end{pmatrix}$, then what are the values of $x$and y respectively?

A. 1, 4 B. -4, -1 C. 3, 1

D. 0, -3

52. Let $A$and Bbe $3x3$ matrices such that $A=\begin{pmatrix} 2 & 0 & 0 \\ 1 & 5 & 0 \\ 0 & -1 & \frac{1}{2} \end{pmatrix}$

and $|B|=\frac{1}{10}$, then $|2AB|=$ _____

A.100 B. 4 C. 16

D. 400

53. The simplified form of $3i^{40}-2i^{115}+i^{82}$ is equal to

A. 4-2i B. -2 -2i C. 2+2i

D. -4+2i

54. Let $a,b,c,d \in IR$ and $\begin{vmatrix} a & b \\ c & d \end{vmatrix}$ =5, then $\begin{vmatrix} 3c & 3d \\ a & b \end{vmatrix}$ = _____.

A. 8 B. 15 C. -8

D. -15

55.A spherical balloon is inflated at the rate of $4cm^3/\min$. How fast is the radius of the balloon increasing when the radius is 6 cm

A. $\frac{1}{36\pi}cm/\min$ B. $\frac{1}{27\pi}cm/\min$ C. $\frac{1}{24\pi}cm/\min$ D. $\frac{1}{9\pi}cm/\min$

56. The radius of a right circular cylinder of height 10 cm increase at the rate of $3cm/\min.$ what

is the rate of change of the volume of cylinder when the radius is 8cm?

A. $480\pi\, cm/\min$ C. $8\pi\, cm/\min$

B. $320\pi\, cm/\min$ D. $640\pi\, cm/\min$

57. $\int \frac{7x+6}{x^2-4}dx=$¿¿

A. $5\ln|x-2|+2\ln|x+2|+c$ C. $2\ln|x-2|-5\ln|x+2|+c$

B. $3\ln\left|\frac{x+2}{x-2}\right|+C$ D. $-3\ln\left|\frac{x-2}{x+2}\right|+C$

58. Let $y=xe^x$, then $\frac{d^n y}{dx^n}$ is equal to

A. $e^x(n-x)$ B. $e^x(2n-x)$ C. nxe^x D. $e^x(n+x)$

59. The fourth derivation of $f(x)=2x^5-3x^4+1$ is

A. 160x-48 B. 240x-72 C. 120x-36 D. 84x

60. If $\frac{(n+1)!}{(n-1)!} = 12$, then n = _____

A. 4 B. 5 C. 3 D. 2

61. From the letters A, B, C, D, E, F, G, how many three letter "words" can be formed? (the words need not have meanings)

A. 210 B. 120 C. 256 D. 48

62. In the expansion of $(2x+5y)$,,What is the coefficient of x^2y^3 ?

A. 5000 B. 2550 C. 100 D. 350

63. A die is rolled once. What is the probability that it is even or it is divisible by 3?

A. $\frac{2}{3}$ B. $\frac{1}{3}$ C. $\frac{5}{6}$ D. $\frac{1}{2}$

64. If $\begin{vmatrix} 2 & -2 & 1 \\ x & 1 & 0 \\ 3 & 1 & 2 \end{vmatrix} = 1$, then x = _____

A. 0 B. -3 C. -1 D. 2

65. In a library there are 3 Mathematics, 2 Geography and 4 Economics books. If each of them will be put on a shelf and each type of a book are identical, in how many ways can these books are arranged?

A. 3280 B. 820 C. 456 D. 1260