FAMAT Algebra 2 January Regional Individual Test

Answer "E. NOTA" means *"none of the above answers are correct"*

1. Determine the value of k so that $2x^2-4x+k=0$ has no real roots.

A. $k>8$

B. $k=1$

C. $k>2$

D. $k<2$

E. NOTA

2. Find the value of $x+y+z$ for:

$2x-3y+4z=29$

$x+2y+3z=8$

$-x+4y+2z=-6$

A. -4

B. 7

C. 3

D. 5

E. NOTA

3. The solution to $\left|\frac{-2}{3}x+6\right|\geq 8$ is:

A. $x\geq -3$

B. $x\leq 21$ or $x\geq 3$

C. $x\leq -3$ or $x\geq 21$

D. $-3\leq x\leq 21$

E. NOTA

4. If $\log 2=a$ and $\log 3=b$, find $\log 72$ in terms of a and b.

A. $3a+2b$

B. $5ab$

C. $2a+3b$

D. a^2b^3

E. NOTA

5. Find the coefficient of the third term of the expansion of $(x-3y)^5$.

A. 6

B. 10

C. 54

D. 90

E. NOTA

6. Find the value of $3x-2y$.

Given the system

$10x-5y=9$

$4x-y=8$

A. $\frac{5}{10}$

B. $\frac{19}{10}$

C. $\frac{53}{10}$

D. $\frac{67}{10}$

E. NOTA

7. Find the value of x for $16^x=\sqrt[6]{1024}$

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

B. $\frac{12}{5}$

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

D. $\frac{5}{12}$

E. NOTA

8. Solve for x.

$\log_4(x-2)+\log_4(2x-3)=2\log_4 x$

A. $\{-1,-6\}$

B. $\{5\}$

C. $\{1,6\}$

D. $\{6\}$

E. NOTA

9. Solve for x.

$$\begin{vmatrix} x-1 & 2 \\ 3 & x-2 \end{vmatrix} = 0$$

A. $\{-1\}$

B. $\{1,-4\}$

C. $\{4\}$

D. $\{-1,4\}$

E. NOTA

10. Find the value of k so that $[B]$ is the inverse of $[A]$.

$$A = \begin{bmatrix} -1 & 2 \\ -1 & 1 \end{bmatrix} \quad B = \begin{bmatrix} k & -2 \\ 1 & -1 \end{bmatrix}$$

A. -1

B. 1

C. 2

D. 0

E. NOTA

11. Simplify.

$$\log_8 \sqrt{8} + \log_8 4 + 8^{\log_8 5} + \log_8 2 - 3\log_8 64$$

A. $\frac{1}{2}$

B. $\frac{2}{3}$

C. $\frac{3}{2}$

D. $\frac{13}{2}$

E. NOTA

12. Find the value of k so that $[f \circ g](x) = x$ for $f(x) = 2x + k$ and $g(x) = \frac{1}{2}x + 5$.

A. -10

B. $\frac{-5}{2}$

C. 5

D. 10

E. NOTA

13. An auditorium has 30 rows of seats. There are 18 seats in the first row, 19 seats in the second row, 20 seats in the third row, and so on. If 600 people come to watch a performance, how many seats will remain empty?

A. 330

B. 345

C. 360

D. 375

E. NOTA

14. Solve over the real numbers.

$$\sqrt{7x+21} - x = 3$$

A. {-3}

B. {-3,-10}

C. {4}

D. {-3,4}

E. NOTA

15. Find the equation of the line that passes through the vertices of

$$y = x^2 - 8x + 13$$

$$y = x^2 - 10x + 27$$

A. $y = x - 3$

B. $y = 5x + 27$

C. $y = 5x - 23$

D. $y = -1x + 7$

E. NOTA

16. Solve. $x^3 + x^2 - 12x \le 0$

A. $(-\infty, 3]$

B. $[0,3]$

C. $(-4,3)$

D. $(-\infty,4] \cup [0,3]$

E. NOTA

17. Solve: $16^{2x+4} = 8^{3x-4}$

A. 28

B. 12

C. 13

D. 19

E. NOTA

18. A company purchases a machine for \$120,000 and it depreciates at a rate of 30% per year. (In other words, at the end of each year the depreciated value is 70% of what it was in the beginning of the year). Find the depreciated value of the machine after 5 years.

A. \$0

B. \$291.60

C. \$20, 168.40

D. \$99,831.60

E. NOTA

19. Find x if
$\log_4(x-3)+\log_4(x+3)=2$

A. $\pm\sqrt{11}$

B. 4

C. 16

D. 5

E. NOTA

20. Which of the following is a possible rational root of the function
$g(x)=6x^3+7x^2+5x-15$

A. $\frac{2}{5}$

B. $\frac{2}{3}$

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

D. 2

E. NOTA

21. Solve the equation for x.

$$\frac{1}{x-2}=\frac{3}{x+2}-\frac{6x}{x^2-4}$$

A. -4

B. -1

C. -2

D. 4

E. NOTA

22. If $f(x)=x^3+1$ and $g(x)=2x-6$
Find $\left[g^{-1}\circ f^{-1}\right](2)$

A. $\frac{-5}{2}$

B. 4

C. $\sqrt[3]{3}$

D. $\frac{7}{2}$

E. NOTA

23. Given that $x=-3$ is a root of $x^3-5x^2-7x+51$, find the sum of the remaining roots.

A. 0

B. -8

C. 8

D. 17

E. NOTA

24. If $f(a)=-a^2+2$ and
$h(a,b)=b^2-2ab+a^2$,
then $h(4,f(-3))=$

A. 23

B. 49

C. 121

D. 31

E. NOTA

25. You are considering two job offers. Company A is offering a salary of \$27,000 and semiannual raises of \$500 while Company B is offering \$25,000 with semiannual raises of \$750. In how many years will the salary from Company A be \$2000 less than Company B?

A. 4

B. 10

C. 12

D. 16

E. NOTA

26. Find the value of k so that the system of equations is inconsistent.

$2x+3y=6$

$5x-ky=8$

A. $\frac{15}{2}$

B. $\frac{-1}{2}$

C. $\frac{7}{2}$

D. $\frac{-15}{2}$

E. NOTA

27. Find the x-intercept of the line that passes through the midpoint of the line segment with endpoints at $(4,2)$ and $(-8,8)$ and is parallel to $6x-2y=9$

A. $\frac{-1}{3}$

B. $\frac{-11}{3}$

C. 11

D. $\frac{13}{3}$

E. NOTA

28. Write the equation of a circle with the center at $(3,-2)$ and passing through $(13,22)$ in the form $x^2+y^2+bx+cy=d$

A. $x^2+y^2+6x-4y=13$

B. $x^2+y^2-6x+4y=13$

C. $x^2+y^2-6x+4y=663$

D. $x^2+y^2-6x+4y=21$

E. NOTA

$i=\sqrt{-1}$

29. If $3i$ is a root of $x^4+3x^3+13x^2+27x+36$ another root is:

A. $\frac{9+\sqrt{10}}{2}$

B. $\frac{-3-i\sqrt{10}}{2}$

C. -4

D. $\frac{-3+i\sqrt{7}}{2}$

E. NOTA

30. $f(x)=\begin{cases}-x+5 & ;x>3\\ 10 & ;x=3\\ -x^2 & ;x<3\end{cases}$

Find $f(3)+2f(5)-f(-4)$

A. -16

B. 26

C. 19

D. 36

E. NOTA