Plant 8

MARCH REGIONAL **ALGEBRA 2** **March, 1999**

NOTE: Choice " e) NOTA " indicates "none of the above"

1. If $k(x) = -3x^2 - 7x + 1$, then $k(-2)$ equals

a) -25 b) -2 c) 3 d) 27 e) NOTA

2. SOLVE over the REALS: $3(5 - 2x) - {}^-4x > 5(x - {}^-3) - 7$

a) $x < \frac{19}{3}$ b) $x > \frac{11}{3}$ c) $x > -1$ d) $x < 1$ e) NOTA

3. COMPLETELY FACTOR : $6x^2 - 37x - 60$

One of the factors is :

a) $3x - 4$ b) $x + 6$ c) $3x - 10$ d) $2x - 15$ e) NOTA

4. SOLVE over the REALS : $12x^2 - 11x = 56$

One of the roots is :

a) $\frac{-8}{3}$ b) -2 c) $\frac{-7}{4}$ d) $\frac{3}{8}$ e) NOTA

5. Find the largest of four consecutive even integers, if we know that the difference of the square of the fourth even integer and the square of the second even integer is 416 .

a) 40 b) 44 c) 46 d) 48 e) NOTA

6. Write the equation of a circle with center at $({}^-3, 5)$ and passing through $(5, {}^-10)$ in the form $x^2 + y^2 + bx + cy = d$.

a) $x^2 + y^2 - 6x + 10y = 289$

b) $x^2 + y^2 + 6x - 10y = 51$

c) $x^2 + y^2 + 6x - 10y = 255$

d) $x^2 + y^2 - 6x + 10y = 323$

e) NOTA

7. GIVEN : $3x^3 - 5x^2 = 9x + 24$ Find the product of the three roots.

a) -3 b) $\frac{5}{3}$ c) 8 d) 24 e) NOTA

8. SIMPLIFY : $\dfrac{6 + 3\sqrt{2}}{\sqrt{5} - \sqrt{2}} - 2\sqrt{5}\left[1 + \dfrac{\sqrt{2}}{2}\right]$

a) $4\sqrt{5} + \sqrt{10} + 6$

b) $6\sqrt{7} + 3\sqrt{10} + 6$

c) $3\sqrt{5} + 4\sqrt{2} + 3$

d) $2\sqrt{2} + 6$

e) NOTA

9. SOLVE for x over the REALS : $3x - 8 < 5(4 - x) \leq 3(x + 5)$

a) $x > \dfrac{7}{2}$ or $x \leq \dfrac{5}{8}$

b) $\dfrac{5}{8} \leq x < \dfrac{7}{2}$

c) $x < \dfrac{7}{2}$

d) $x \geq \dfrac{5}{8}$

e) NOTA

10. SOLVE over the positive REALS : $\text{Log}_7 (6x - 13) + \text{Log}_7 (x + 1) = 1$

a) $\dfrac{4}{3}$ b) $\dfrac{3}{2}$ c) 2 d) $\dfrac{5}{2}$ e) NOTA

11. SIMPLIFY : $\dfrac{{}^-3^4 - (28 - 30)({}^-4 - {}^-3)^{43}({}^-587 - {}^-549)(58 - 59)^{78}}{({}^-38 - {}^-35)({}^-28 - {}^-29)(48 - 50)^5}$

a) $\dfrac{-157}{35}$ b) $\dfrac{-5}{96}$ c) $\dfrac{41}{13}$ d) $\dfrac{157}{96}$ e) NOTA

12. SOLVE for x and y: The system $\begin{aligned} 3x + 8y &= 17 \\ 2x - 3y &= 8 \end{aligned}$

Now give the value of $x + y$

a) 4 b) 5 c) $\dfrac{17}{4}$ d) $\dfrac{13}{5}$ e) NOTA

13. Write the equation of a line perpendicular to $3x - 5y = 11$ and passing through $(^-3, 2)$. Express answer in $ax + by = c$ form.

a) $5x + 3y = -9$

b) $3x - 5y = -19$

c) $5x - 3y = -21$

d) $3x + 5y = 1$

e) NOTA

14. Find the integer solutions of $3x^2 + 8x + 2 < 0$.

a) -3,-2,-1,0 b) -2,-1,0 c) -2,-1 d) -1,0 e) NOTA

15. If one inserts three geometric means (written a1,a2,a3 in increasing order) between 6 and 24, what is the value of a2 ?

a) 15 b) $12\sqrt[3]{2}$ c) $6\sqrt[3]{4}$ d) 12 e) NOTA

16. Which of the following is an endpoint of the minor axis of the ellipse whose equation is $9(x - 3)^2 + 25(y - 4)^2 = 225$?

a) (8, 4) b) (3, 7) c) $(^-6, 4)$ d) $(3, ^-1)$ e) NOTA

17. SIMPLIFY : $\text{Log}_4\ 32 - \text{Log}_9\ 3$

a) 3 b) 2 c) $\frac{3}{2}$ d) $\frac{1}{2}$ e) NOTA

18. Determine the value of k so that $2x^2 - 8x + k = 0$ has no real roots.

a) k = 16 b) k < 12 c) k > 8 d) k > 12 e) NOTA

19. SOLVE for x: $27^{2x-1} = 9^{3x+2}$

a) 7 b) 3 c) -3 d) f e) NOTA

20. Write the parabola whose vertex is (-3, 2) and whose focus is (-3, 7).

a) $y = -20(x + 3)^2$

b) $y = \frac{1}{20}(x + 3)^2 + 2$

c) $y = \frac{-1}{20}(x + 3)^2 + 2$

d) $y = -16(x + 3)^2 + 2$

e) NOTA

21. Find an x value so that $\begin{vmatrix} x & 2 & 0 \\ 0 & x & 1 \\ 1 & 3 & 2 \end{vmatrix} = 7$

a) -1 b) 1 c) $\frac{2}{5}$ d) $\frac{-5}{2}$ e) NOTA

22. Find the 41st term of -35 , -26, -17, . . .

a) -395 b) 334 c) 325 d) 316 e) NOTA

23. Find the fourth term of $(2x - y^2)^7$.

a) $35x^4y^6$ b) $-560x^4y^6$ c) $280x^3y^6$ d) $-280x^4y^6$ e) NOTA

24. The difference between the length and width of a rectangle is 15. If the perimeter is 54, then find the area of the rectangle.

a)450 b) 250 c) 216 d) 126 e) NOTA

25. If a1 and a7 are part of a geometric sequence and a1 = 32 and a7 = 4, find the ratio of of the geometric sequence.

a) 2 b) $\sqrt{2}$ c) $\frac{\sqrt{2}}{2}$ d) $\sqrt[3]{2}$ e) NOTA

26. EVALUATE : $\begin{vmatrix} -3 & 8 & 7 \\ 6 & 2 & 4 \\ 1 & 5 & 0 \end{vmatrix}$

a) 224 b) 234 c) 256 d) 288 e) NOTA

27. Given $B = \begin{bmatrix} 2 & -3 & 5 & 8 \\ 4 & 0 & -2 & 1 \\ -3 & 4 & 6 & -3 \end{bmatrix} \begin{bmatrix} 2 & 1 & 8 & 5 \\ 0 & 1 & 2 & 4 \\ -3 & 5 & -3 & 2 \\ 1 & -2 & -4 & 7 \end{bmatrix}$

Find the b_{33} entry of matrix B

a) -22 b) -46 c) -56 d) product not possible e) NOTA

28. If $A = \sum_{i=1}^{17} (2i + 3)$ and $B = \sum_{i=4}^{20} (2i - 3)$, find $A - B$

a) -72 b) -37 c) -12 d) 37 e) NOTA

29. If a = sum of the roots of $3x^4 - 12x^3 + 9x^2 - 9 = 0$ and b = the product of the roots of $4x^3 + 10x^2 - 12x + 8 = 0$, find the product ab .

a) -8 b) -6 c) 4 d) 12 e) NOTA

30. Find the inverse of the matrix $A = \begin{bmatrix} -3 & -4 \\ 7 & 9 \end{bmatrix}$, then find the value of $\left[\det (A^{-1}) + a_{12} \text{ entry of } A^{-1} \right]$.

a) 5 b) -50 c) -57 d) -6 e) NOTA