T H E T A INDIVIDUAL TEST
FAMAT STATE CONVENTION 2002

For all questions, "e) NOTA" means that none of the above answers is correct.

1. Two vertical angles have measures of $3x$ and $x^2 - 28$, then their measure is

   a) 21° b) 7° c) 70° d) 14° e) NOTA

2. If $\frac{1}{a} + \frac{1}{c} = \frac{1}{b}$, $b \neq \pm c$ and a,b,c are nonzero numbers, then a equals

   a) $\frac{bc}{b - c}$ b) $\frac{bc}{b + c}$ c) $\frac{c - b}{bc}$ d) $\frac{b + c}{bc}$ e) NOTA

3. Given $\triangle XYZ \sim \triangle MNR$, $\frac{XY}{MN} = \frac{3}{5}$, and the Area of $\triangle XYZ$ is $36\ cm^2$, then the Area of $\triangle MNR$ is

   a) $21.6\ cm^2$ b) $36\ cm^2$ c) $60\ cm^2$ d) $100\ cm^2$ e) NOTA

4. The sum of the interior angles of a polygon is 3060°. Find the number of sides of the polygon.

   a) 20 b) 19 c) 18 d) 17 e) NOTA

5. Find the sum of the first 53 terms of $-17, -11, -5, \ldots$.

   a) 6375 b) 7367 c) 10196 d) 15635 e) NOTA

6. Solve over the REALS : $3x^3 - 12x^2 + 5x - 20 = 0$

   a) $4, \frac{\pm\sqrt{15}}{3}$ b) $\frac{\pm\sqrt{15}}{3}$ c) 4 d) $\varnothing$ e) NOTA

7. If the DOMAIN of $f(x) = x^2 + 2$ is $\{-3 < \text{reals} \leq 2\}$, then the RANGE of $f(x)$ is

   a) $\{4 \leq \text{reals} \leq 9\}$

   b) $\{4 \leq \text{reals} < 9\}$

   c) $\{2 \leq \text{reals} < 11\}$

   d) $\{6 \leq \text{reals} < 11\}$

   e) NOTA

8. If one were to expand $(x^3 - 3y)^5$, then the sum of the coefficients of all the terms of the expansion is

a) -32 b) -17 c) 32 d) 212 e) NOTA

9. SOLVE for $x \geq -1$: $9x^2 - 6x \geq 20$

a) $x \geq \frac{1 + \sqrt{19}}{3}$

b) $x \leq \frac{1 - \sqrt{19}}{3}$

c) $x \geq \frac{1 + \sqrt{21}}{3}$

d) $\frac{1 - \sqrt{19}}{3} \leq x \leq \frac{1 + \sqrt{19}}{3}$

e) NOTA

10. Find the value(s) of h so that $x^2 + hx + (h-1) = 0$ has no real roots.

a) $h = 3$ b) $-2 < h < 2$ c) reals d) $\emptyset$ e) NOTA

11. If a, b, and c are real numbers , $a + b \neq c$ and $ax + bx = cx$, then find the value of $(a + b - c)^x + (c - a - b)^{2x}$.

a) 2 b) 5 c) 6 d) cammot be determined e) NOTA

12. SIMPLIFY: $(-bx)(xb^{-1} - bx^{-1}))b - x)^{-1}$ with $b \neq x$, $b \neq 0$ and $x \neq 0$

a) $x - b$ b) $x + b$ c) $\frac{2b^2}{b - x}$ d) undefined e) NOTA

13. Find all the values of x that satisfy $\begin{vmatrix} 5 & 1 & x \\ 8 & x & 2 \\ 4 & x & 4 \end{vmatrix} = 0$.

a) 4, -1.5 b) 4 c) -4, 1.5 d) -4 e) NOTA

14. SOLVE over the reals : $(k + 1)^2 + 3(k + 1) - 4 = 0$

a) 4, 0 b) -4, 1 c) 3, 1 d) -5, 0 e) NOTA

15. If $y = \log_2 8$ and $x = (\log_8 2)^y$, then $\log_3 x$ equals

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

16. If $\log 2 = 0.301$ and $\log 2.5 = 0.398$, then $\log 8(2.5)$ equals

a) 1.301 b) 1.398 c) 1.000 d) 1.20 e) NOTA

17. Write a Quadratic equations whose roots are the reciprocals of the solutions for $2x^2 - 7x + 3 = 0$.

a) $2x^2 - 3x + 7 = 0$

b) $3x^2 - 7x + 2 = 0$

c) $3x^2 - 11x + 6 = 0$

d) $7x^2 - 3x + 2 = 0$

e) NOTA

18. If the DOMAIN of $f(x) = \{ -5 \leq \text{reals} \leq 7 \}$ and the RANGE of $f(x) = \{ 2 \leq \text{reals} \leq 15 \}$ and $g(x) = 2f(x) - 3$, then find the range of $g(x)$.

a) $\{ 7 \leq \text{reals} \leq 33 \}$

b) $\{ 4 \leq \text{reals} \leq 33 \}$

c) $\{ 1 \leq \text{reals} \leq 27 \}$

d) cannot be determined

e) NOTA

19. If $f(2) = 12$, $f(-1) = y$ and slope of $f(x) = 3$, then find y.

a) -3 b) -1 c) 1 d) 4 e) NOTA

20. SOLVE the system : $3x - 5y = 14$
$2x + 3y = -6$

NOW Evaluate $10x - 4y$

a) 32 b) 21 c) 17 d) 12 e) NOTA

21. SOLVE for x: $16^{x-1} = 64$

a) 5 b) 2.5 c) 2 d) 1.5 e) NOTA

22. When one expresses the rational number $2.03467\overline{467}...$ as a fraction, what is the denominator of the fraction ?

a) 99999 b) 9900 c) 99900 d) 999 e) NOTA

23. If $\log_2 24 - \log_2 3 = x$, then the value of x is

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

24. Express in simplest form : $\left[2^{x+1}\right]\left[3^{x-1}\right]\left[54\right]$

a) $\left[2^{x+2}\right]\left[3^{x-1}\right]$ b) 6^{x-1} c) $\left[2^{x+1}\right]\left[3^{x+3}\right]$ d) 6^{x+2} e) NOTA

25. Y varies directly as the square root of x and inversely as p. If y =15 when x = 25 and p = 4, then find y when x = 9 and p = 9,

a) 4 b) 6 c) $\frac{18}{5}$ d) $\frac{108}{125}$ e) NOTA

26. EVALUATE : $\left[4 - \frac{1}{2}\right]\left[1 - \frac{1}{3}\right]\left[1 - \frac{1}{4}\right]\left[1 - \frac{1}{5}\right] \cdots \left[1 - \frac{1}{10}\right]$

a) $\frac{1}{2}$ b) $\frac{35120}{32800}$ c) $\frac{7}{10}$ d) $\frac{9}{20}$ e) NOTA

27. If $31x - x^2$ is supplementary to 150^o , then x equals

a) 30 b) 30, 1 c) 25 d) 28 e) NOTA

28. If $a - 2b = 4$ and $ab = 3$, then evaluate $a^2 + 4b^2$

a) 4 b) 10 c) 15 d) 28 e) NOTA

29. SIMPLIFY : $-2i\left[i^{53} - 5i^{262}\right]$

a) $10 - 2i$ b) $5 - 2i$ c) $2 - 5i$ d) $2 - 10i$ e) NOTA

30. If $a * b = a^2 - ab$ and $a \& b = b(a - 3) - 6$, find $3 * (8 \& 5)$.

a) -48 b) -45 c) -21 d) 21 e) NOTA