

1/6

Palm Harbor

FAMAT REGIONAL TEST

ALGEBRA 2

FEBRUARY, 1999

If no correct answer is given, choose E. NOTA

1. Two numbers are in the ratio 6:11. If the smaller number is decreased by 4 and the larger number is increased by 6, the resulting ratio is 4:9. What is the original smaller number?

- A. 6                      B. 24                      C. 36                      D. 48                      E. NOTA

2. Consider a pair of perpendicular lines. If the slope of one of these lines is zero, then the slope of the other line is

- A. -1                      B. 0                      C. 1                      D. undefined                      E. NOTA

3. If  $f(x) = 3^x$  then  $f(x+1) - f(x) =$

- A. 3                      B.  $f(x)$                       C.  $2f(x)$                       D.  $3f(x)$                       E. NOTA

4. An equivalent of the expression  $\left(\frac{x^2+1}{x}\right)\left(\frac{y^2+1}{y}\right) - \left(\frac{x^2-1}{y}\right)\left(\frac{y^2-1}{x}\right)$  for  $xy \neq 0$  is

- A. 0                      B. 1                      C.  $\frac{x}{y} - \frac{y}{x}$                       D.  $\frac{2y}{x} + \frac{2x}{y}$                       E. NOTA

5. When the polynomial  $x^4 - 9x^3 + 9x^2 - 9$  is divided by  $x - 2$ , the remainder is

- A. -29                      B. -9                      C. 99                      D. 115                      E. NOTA

6. For  $n$  an integer  $> 1$ ,  $\frac{(n-1)!(n+1)!(n+2)!}{(n-2)!n!(n+3)!} =$

- A.  $\frac{1}{3}$                       B.  $\frac{n^2-1}{n+3}$                       C.  $\frac{n+1}{n^2-5n-6}$                       D.  $\frac{n^2+3n+2}{n^2+3n}$                       E. NOTA

7. When the ellipse with equation  $\frac{(x-10)^2}{25} + \frac{(y+3)^2}{4} = 1$  is graphed on the X-Y coordinate plain, all points lie in the

- A. 1st quadrant                      B. 2nd quadrant                      C. 3rd quadrant                      D. 4th quadrant                      E. NOTA

8. The locus of points equidistant from the point  $(0,6)$  and the line with equation  $y = 5x + 2$  is a(n)
- A. line      B. parabola      C. ellipse      D. hyperbola      E. NOTA
9. The set of irrational numbers is closed under the operation
- A. addition      B. subtraction      C. multiplication      D. division      E. NOTA
10. Given:  $i = \sqrt{-1}$ .  $(1+i)^{10} - (1-i)^8 =$
- A.  $32 - 16i$       B.  $32 + 16i$       C.  $16 - 32i$       D.  $16 + 32i$       E. NOTA
11. The area enclosed by the graph of the equation  $|x| + |y| = a$  where  $a$  is a real number  $> 0$ , is
- A.  $a^2$       B.  $2a^2$       C.  $3a^2$       D.  $4a^2$       E. NOTA
12. The quadratic equation  $x^2 - 19x + 99 = 0$  has exactly
- A. one real root      B. 2 real roots      C. one real root and one complex root  
D. two complex roots      E. NOTA
13. How long will it take \$1,000 to double if it is invested at 6% interest and compounded semi-annually?
- A. Less than 10 years      B. Between 10 and 11 years      C. Between 11 and 12 years  
D. More than 12 years      E. NOTA
14. A  $(2,5)$ , B  $(14,9)$ , and C  $(5,11)$  are vertices of a triangle. What is the length of the median of this triangle from point C?
- A. 5      B.  $3\sqrt{5}$       C.  $2\sqrt{7}$       D. 6      E. NOTA
15. If the sixth term of an arithmetic sequence is 20 and the tenth term is 320, then the value of the twelfth term is
- A. 470      B. 480      C. 490      D. 500      E. NOTA

16.  $\sum_{n=0}^{\infty} \left(\frac{3}{4}\right)^n (-1)^n =$

A.  $\frac{3}{7}$

B.  $\frac{4}{7}$

C. 3

D. 4

E. NOTA

17. If  $f(x) = \frac{x-1}{x+1}$ , then  $f^{-1}(x) =$

A.  $\frac{x+1}{1-x}$

B.  $\frac{x+1}{x-1}$

C.  $\frac{x-1}{1-x}$

D.  $\frac{x-1}{x+1}$

E. NOTA

18. If  $x$  is a real number and  $\begin{vmatrix} x & -3 & x \\ x^2 & 3 & x^2 \\ x & -3 & 1 \end{vmatrix} = -18$  then  $x =$

A. 0

B. 1

C. 2

D. 3

E. NOTA

19. If  $f(x) = x^3$  then  $\frac{f(x+h) - f(x)}{h} =$

A. 1

B.  $h^2$

C.  $x^2 + xh - 1$

D.  $3x^2 + 3xh + h^2$

E. NOTA

20. The domain of the function  $f(x) = \sqrt{\frac{x-5}{x^2-7x+12}}$  is

A.  $\{x: x < 3 \text{ or } x > 5\}$

B.  $\{x: x < 3 \text{ or } 4 < x \leq 5\}$

C.  $\{x: 3 < x < 4 \text{ or } x \geq 5\}$

D.  $\{x: 3 \leq x \leq 4 \text{ or } x \geq 5\}$

E. NOTA

21. Suppose  $z$  varies directly as the square of  $x$  and inversely as the cube of  $y$ . If  $z = 4$  when  $x = 3$  and  $y = 2$  then what is the value of  $z$  when  $x = 4$  and  $y = 3$ ?

A. 2

B.  $\frac{512}{243}$

C.  $\frac{481}{123}$

D. 5

E. NOTA

22. If two cards are selected at random without replacement from a standard deck of 52 cards, what is the probability that one card is red and one card is a black jack?

A.  $\frac{1}{102}$

B.  $\frac{1}{52}$

C.  $\frac{2}{51}$

D.  $\frac{1}{17}$

E. NOTA

23. Suppose the graphs of a circle and a hyperbola are sketched on the same coordinate plane. Which of the following is/are true?
- The graphs could intersect in exactly one point.
  - The graphs could intersect in exactly two points.
  - The graphs could intersect in exactly three points.
  - The graphs could intersect in exactly four points.
- A. I and III only    B. II only    C. II and IV only    D. IV only    E. NOTA
24. When the repeating decimal  $0.\overline{39}$  is expressed as a reduced fraction, the sum of the numerator and the denominator is
- A. 46    B. 99    C. 138    D. 139    E. NOTA
25. The sum of the coefficients in the expansion of  $(a + 9b - 9c + 9)^4$  is
- A.  $9^4$     B.  $10^4$     C.  $19^4$     D.  $99^4$     E. NOTA
26. If  $\begin{bmatrix} 6 & 8 \\ 7 & 9 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$  then x equals
- A. -10    B. -8    C. 8    D. 10    E. NOTA
27. The value of  $\log_{19} 99 + \log_{99} 19 - (\log_{99} 19)(\log_{19} 99)$  rounded to the nearest hundredth is
- A. 1.19    B. 1.20    C. 2.19    D. 2.20    E. NOTA
28. When  $19^{99}$  is divided by 5, the remainder is
- A. 1    B. 2    C. 3    D. 4    E. NOTA
29. The length of the minor axis of the ellipse with equation  $3x^2 + 4y^2 - 18x - 16y + 31 = 0$  is
- A.  $\sqrt{3}$     B.  $2\sqrt{3}$     C. 2    D. 4    E. NOTA
30. The degree of  $(x^3 + 1)^4 (x^4 + 1)^5$  as a polynomial in x is
- A. 12    B. 16    C. 20    D. 32    E. NOTA