

12
PLANT CITY HIGH SCHOOL INVITATIONAL
PRE CALCULUS INDIVIDUAL TEST

MARCH 13, 1999

Note: NOTA stands for none of the above.

1. How many times does the function
 $f(x) = 8x^{10} + 6x^8 + 2x^4 + x^2 + 5$ cross the x-axis?

- a) 0
- b) 2
- c) 8
- d) 10
- e) NOTA

2. Find all asymptotes for the graph of $y = \frac{x^3 - 8}{x^2 - 4}$.

- a) $x = \pm 2$
- b) $x = \pm 2, y = x$
- c) $x = \pm 2, y = 4x - 8$
- d) $x = -2, y = x$
- e) NOTA

3. Solve for all values of θ in the interval $0 \leq \theta \leq \pi$.

$$\cos^2 2\theta - \sin^2 2\theta = 0.$$

- a) $\frac{\pi}{2}$
- b) $\frac{\pi}{8}, \frac{3\pi}{8}$
- c) $\frac{\pi}{8}, \frac{3\pi}{8}, \frac{5\pi}{8}, \frac{7\pi}{8}$
- d) $\frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \frac{7\pi}{2}$
- e) NOTA

4. Evaluate $1^3 + 2^3 + 3^3 + \dots + 200^3$.

- a) 200^4
- b) $20,000^2$
- c) $20,100^2$
- d) $60,300^2$
- e) NOTA

5. Solve for matrix X.

$$\begin{bmatrix} 4 & 3 \\ 2 & 2 \end{bmatrix} \cdot X = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

- a) $\begin{bmatrix} -2 & 1 \\ 1.5 & -1 \end{bmatrix}$
- b) $\begin{bmatrix} 1 & 1.5 \\ -1 & 2 \end{bmatrix}$
- c) $\begin{bmatrix} 2 & 1.5 \\ 1 & 1 \end{bmatrix}$
- d) $\begin{bmatrix} 1 & -1.5 \\ -1 & 2 \end{bmatrix}$
- e) NOTA

6. Find the next term of the harmonic sequence $4, 1\frac{1}{3}, \frac{4}{5}, \dots$

- a) $\frac{1}{3}$ b) $\frac{2}{5}$ c) $\frac{4}{7}$ d) $\frac{7}{4}$ e) NOTA

7. Simplify: $\sin^4x + \sin^2x - \cos^4x + \cos^2x$.

- a) 2
b) $2\sin^2x$
c) $\sin^2x - \cos^2 - 1$
d) $2\sin^2x - 2\cos^2x$
e) NOTA

8. Find $\lim_{x \rightarrow 4} \frac{4 - x}{2 - \sqrt{x}}$.

- a) 0
b) 2
c) $2\sqrt{2}$
d) 4
e) NOTA

9. How many positive integral factors does 1938 have?

- a) 8
b) 12
c) 16
d) 32
e) NOTA

10. Find the sum of the infinite series $\frac{1}{3} + \frac{2}{9} + \frac{3}{27} + \frac{4}{81} + \dots$

- a) $\frac{1}{2}$ b) $\frac{2}{3}$ c) $\frac{4}{5}$ d) 1 e) NOTA

11. What is the units digit of 2^{1999} ?

- a) 2
b) 4
c) 6
d) 8
e) NOTA

12. Evaluate: $\sum_{x=1}^{120} (\log_6 9^x + \log_6 4^x)$

- a) 7260
- b) 14,520
- c) 29,040
- d) 43,560
- e) NOTA

13. Find the distance between the polar coordinates $(\sqrt{2}, 45^\circ)$ and $(\sqrt{2}, 135^\circ)$.

- a) $\sqrt{2}$
- b) 2
- c) $2\sqrt{2}$
- d) 90
- e) NOTA

14. For the number 32,323,232,3_3,232,323,232 what single digit would go in the blank to make the number divisible by 11?

- a) 1
- b) 2
- c) 5
- d) 8
- e) NOTA

15. What numbers can x and y be if they satisfy all of the following conditions: 1) they are both Real numbers 2) $y = x$ and 3) $\log \frac{x^3}{y} = \log \frac{y^3}{x}$?

- a) Any Real numbers
- b) All positive Real numbers
- c) All negative Real numbers
- d) All positive integers.
- e) NOTA

16. If $a^2 + b^2 = 15$ and $ab = 5$, then find $a + b$.

- a) 5
- b) 10
- c) $\sqrt{10}$
- d) ± 5
- e) NOTA

17. If $f(x) = \sin x \cos x$ and $g(x) = \sin (2x)$ find $2f(x) + g(x)$.

- a) $3 \sin x \cos x$
- b) $2 \sin (2x)$
- c) $2 \sin x \cos x + \sin x$
- d) $3x$
- e) NOTA

18. Find the radius of a circle that is equal in area to the region bounded by an ellipse whose equation is $4x^2 + 9y^2 = 36$.

- a) 4
- b) $\sqrt{6}$
- c) 6
- d) 9
- e) NOTA

19. What is the coefficient of the term containing $x^2y^3z^2$ in the expansion of $(2x + y + z)^7$?

- a) 210
- b) 420
- c) 630
- d) 840
- e) NOTA

20. Triangle ABC is an isosceles triangle with $AC = AB$. $m\angle A = 30$, and $BC = 4$. Find the radius of the circumscribed circle of triangle ABC.

- a) 3
- b) 4
- c) 5
- d) 6
- e) NOTA

21. If $f(x) = \sqrt{x}$ and $g(x) = \frac{1}{x}$, find the domain of $f(g(x))$.

- a) $(-\infty, 0]$
- b) $(-\infty, 0)$
- c) $(0, \infty)$
- d) $[0, \infty)$
- e) NOTA

22. Which functions are symmetric to the y-axis?

I. $f(x) = x^2 + 1$

II. $f(x) = x^3 - 1$

III. $f(x) = |x| + 1$

IV. $f(x) = |x + 1|$

- a) I only b) II only c) I, III, & IV d) I and III e) NOTA

23. Find the coefficient of the term free of x in the expansion

$$\left[2x^2 - \frac{1}{x}\right]^6.$$

- a) -60
- b) -15
- c) 15
- d) 60
- e) NOTA

24. Solve for x : $1235x + 45 \equiv 9090 \pmod{24}$.

a) $x \equiv \frac{9090 \pmod{24} - 45}{1235}$

- b) $x \equiv 7 \pmod{24}$
- c) $x \equiv 8 \pmod{24}$
- d) $x \equiv 15 \pmod{24}$
- e) NOTA

25. If $A = 6i - 3j - 5k$ and $B = 3i - 4j + Nk$, what value of N would make A and B perpendicular?

- a) -5
- b) 1.2
- c) 5
- d) 30
- e) NOTA

26. A ship sets off from port traveling at 12 mph on a course of 135° with a wind blowing directly south-west at 5 mph. What is the actual speed of the ship to the nearest mph?

- a) 13
- b) 15
- c) 17
- d) 18
- e) NOTA

27. Which of the following is an equation of an angle bisector of two lines with equations $4x + 3y = -6$ and $6x - 8y = -7$?

- a) $2x + 14y = 5$
- b) $10x - 5y = -13$
- c) $14x - 2y = -19$
- d) $14x - 2y = 19$
- e) NOTA

28. Evaluate: $\sqrt{42 + \sqrt{42 + \sqrt{42 + \dots}}}$.

- a) 6
- b) 7
- c) -6, 7
- d) 6, -7
- e) NOTA

29. Find the sum of the positive integral divisors of 140?

- a) 288
- b) 297
- c) 309
- d) 336
- e) NOTA

30. Find n if $\frac{1}{n} + \frac{2}{n} + \frac{3}{n} + \dots + \frac{n-2}{n} + \frac{n-1}{n} = 1999$.

- a) 3888
- b) 3997
- c) 3998
- d) 3999
- e) NOTA.