MU ALPHA THETA CONVENTION 1991

RADICAL TOPIC TEST

1. Simplify: $\sqrt{\frac{18x^6}{y}}$, x and y positive.

   A. $\frac{9x^3}{y}$ B. $\frac{3x^3\sqrt{2y}}{y}$ C. $\frac{9x^3\sqrt{y}}{y}$ D. $\frac{3x}{\sqrt{y}}$ E. $\frac{3x\sqrt{y}}{2}$

2. Simplify: $\sqrt{20}-4\sqrt{45}+\sqrt{80}$

   A. $-6\sqrt{5}$ B. $-4\sqrt{145}$ C. $-16\sqrt{5}$ D. 1 E. $3\sqrt{5}$

3. If the square root of the square root of the square root of a number is 3, then the number is:

   A. 3^6 B. $\sqrt[8]{3}$ C. 3^8 D. 3^4 E. $\sqrt[4]{3}$

4. The set of all real numbers satisfying the equation $\sqrt{x^2}=-x$ is equal to:

   A. $\varnothing$ B. $x\leq 0$ C. $x\geq 0$ D. $x\geq 0 \cap x\leq 0$ E. none of these

5. The domain of the real function $f(x)=\frac{1}{\sqrt{x+4}}$ is

   A. $x\in$Reals, $x\neq -4$ B. $x\in$Reals, $x\neq 0$ C. $x\in$Reals, $x>0$
   D. $x\in$Reals, $x>-4$ E. $x\in$Reals, $x\geq -4$

6. Simplify: $\left(\sqrt[5]{\sqrt[5]{b^{20}}}\right)\left(\sqrt{\sqrt{b^{30}}}\right)$, where b>0.

   A. b^7 B. $b^4\sqrt[20]{b^{11}}$ C. $b^4\sqrt[4]{b^3}$ D. $b^5\sqrt[4]{b^3}$ E. $b^8\sqrt[10]{b^3}$

7. Simplify the following by rationalizing the denominator:

$$\frac{\sqrt{2}}{3-4\sqrt{5}}$$

A. $\frac{-\sqrt{10}}{5}$ B. $\frac{-\sqrt{10}}{17}$ C. $\frac{-\left(3\sqrt{2}-4\sqrt{10}\right)}{71}$

D. $\frac{-\left(3\sqrt{2}+4\sqrt{10}\right)}{71}$ E. none of these

8. Find the product: $-\sqrt{16}\cdot\sqrt{-4}\cdot\sqrt{-9}$

A. -24 B. 24 C. -20i D. -10 E. none of these

9. The product of $\sqrt[3]{4a^2b}$ and $\sqrt[4]{8a^3b^2}$ is equivalent to:

A. $\sqrt[7]{32a^5b^3}$ B. $\sqrt[12]{32a^6b^2}$ C. $\left(32a^6b^2\right)^{\frac{7}{12}}$

D. $2ab\sqrt[12]{32a^5b^{10}}$ E. $2a\sqrt[12]{32a^5b^{10}}$

10. Evaluate: $\left[\left(4^{-\frac{3}{2}}\right)\left(\sqrt{2^{12}}\right)+\left(\frac{1}{8}\right)^{-\frac{2}{3}}\right]\div 27^{\frac{1}{3}}$

A. 1 B. 3 C. 4 D. $138\frac{2}{3}$ E. none of these

11. For what real values of x is $\sqrt{(x-3)^2}=x-3$ a true statement?

A. x=3 B. $x\geq 3$ C. no solution D. all reals
E. none of these

12. If a, b, and c are positive integers, the radicals $\sqrt{a+\frac{b}{c}}$ and $a\sqrt{\frac{b}{c}}$ are equal if and only if:

A. a=b=c=1 B. a=2,b=1,c=$\frac{3}{2}$ C. $c=\frac{b(a^2-1)}{a}$
D. a=b and c is any value E. a=b and c=a-1

13. The solutions to of $2\sqrt{x}+2x^{-\frac{1}{2}}=5$ can be found by solving:

A. $16x^2-92x+1=0$ B. $4x^2-25x+4=0$ C. $4x^2-17x+4=0$
D. $2x^2-21x+2=0$ E. $4x^2-25x-4=0$

14. If $\sqrt{x-1}-\sqrt{x+1}+1=0$, then 4x equals:

A. 5 B. $4\sqrt{-1}$ C. 0 D. $1\frac{1}{4}$ E. none of these

15. Simplify: $\left[\frac{\sqrt{2}}{2}+\frac{i\sqrt{2}}{2}\right]^4$ where $i=\sqrt{-1}$

A. 1 B. $\frac{(1-i)}{4}$ C. -1 D. $\frac{-(1+i)}{4}$ E. -2i

16. The two complex numbers represented by $\sqrt{5+12i}$ can each be written in the complex number form $\pm(a+bi)$, where $i=\sqrt{-1}$ and a and b are integers. Find $|a-b|$.

A. 1 B. 5 C. -1 D. -5 E. none of these

17. The number of distinct roots satisfying the equation $\sqrt{5-x}=x\sqrt{5-x}$ are:

A. 1 rational root, 2 imaginary roots
B. 1 rational root, 2 irrational roots
C. 2 real roots D. 3 real roots
E. No real roots

18. If $\sqrt{x+2}=2$, then $(x+2)^2$ equals:

A. $\sqrt{2}$ B. 2 C. 4 D. -8 E. 16

19. The fourth power of $\sqrt{1+\sqrt{1+\sqrt{1}}}$ is:

A. $\sqrt{2}+\sqrt{3}$ B. $\frac{(7+3\sqrt{5})}{2}$ C. $1+2\sqrt{3}$ D. 3

E. $3+2\sqrt{2}$

20. If $x=\sqrt{3+\sqrt{3+\sqrt{3+\ldots}}}$, then x is between:

A. 0.5 and 1 B. 1 and 1.5 C. 1.5 and 2 D. 2 and 2.5
E. none of these

21. $\sqrt{14+6\sqrt{5}}$ can be expressed in the form $a+b\sqrt{5}$, where a and b are positive integers. Find (a+b).

A. 4 B. 5 C. 6 D. 7 E. 8

22. $\sqrt{3+2\sqrt{2}}-\sqrt{3-2\sqrt{2}}$ is equal to:

A. 2 B. $2\sqrt{3}$ C. $4\sqrt{2}$ D. $\sqrt{6}$ E. $2\sqrt{2}$

23. If $\sqrt{m^3+m^3+m^3+m^3+m^3}=25$, then m=

A. 5 B. $\sqrt[3]{5}$ C. 25 D. $\sqrt[3]{25}$ E. none of these

24. If a and b are the two y-intercepts of the graph of $3(x-1)^2+(y-2)^2=39$, then $\sqrt{a+b}=$

A. 1 B. 2i C. $\sqrt{2}$ D. 2 E. i

25. Find the smallest positive number from the numbers below.

A. $10-3\sqrt{11}$ B. $3\sqrt{10}-10$ C. $12-4\sqrt{13}$ D. $9-4\sqrt{5}$
E. $4\sqrt{5}-9$