OU Math Day 2015

Higher Algebra Test

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1. Solve for x where $\dfrac{x-1}{2x+1} = 21$.

    (A) $x = 22/41$ (B) $x = -22/41$ (C) $x = -22/19$ (D) $x = 22/19$ (E) None of the above

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2. For what values of the variable c does $3x^2 - 2x + c$ have two distinct real roots?

    (A) $0 < c < \frac{2}{3}$ (B) $0 \le c \le 13$ (C) $c \ge 6$ (D) $c < \frac{1}{3}$ (E) $c > -\frac{1}{6}$

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3. An electronics store is having a 30% off sale. A tablet is on sale for \$455. What would the same tablet sell for if it were on sale at only 20% off?

    (A) \$500.50   (B) \$520   (C) \$473.20   (D) \$490   (E) None of the above

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4. What is the largest prime divisor of 2015?

    (A) 155   (B) 13   (C) 5   (D) 403   (E) None of the above

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5. What is the largest integer which is a perfect square and divides 2015?

    (A) 403   (B) 169   (C) 25   (D) 1   (E) None of the above

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6. If $f(x) = -2x^5 + 3x^4 - 5x^3 - x^2 + 2x - 1$ then what does $f(-2) + f(2)$ equal?

(A) 143   (B) 86   (C) 200   (D) 2   (E) None of the above

7. What is the largest value of x that satisfies $2x^2 + x + 5 = 11$?

(A) 1.5   (B) -2 (C) 2   (D) 3   (E) None of the above

8. Which of the following equations is **NOT** an identity which holds true for all numbers x and y?

(A) $x^2 - y^2 = (x - y)(x + y)$ (B) $x + y = y + x$ (C) $\sqrt{x(x - y)} = x^2 - xy$
(D) $(x + y + 1)^2 = x^2 + 2xy + y^2 + 2x + 2y + 1$ (E) None of the above

9. Suppose $a \geq 0$. What does $\sqrt{a\sqrt[3]{a\sqrt[4]{a}}}$ equal?

(A) $a\sqrt{a}$ (B) $\sqrt[8]{a}$ (C) $\sqrt[8]{a^3}$ (D) $\sqrt[24]{a^{17}}$ (E) None of the above

10. What is the slope of a line that is perpendicular to the line $3x + 5y = -1$?

(A) 5/3   (B) 3/5   (C) $-3/5$ (D) $-5/3$ (E) None of the above

11. What is the smallest positive integer n for which it will be a Monday 10^n days from today?

(A) 6   (B) 4   (C) 3   (D) 5   (E) None of the above

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12. A pair of integers satisfies the properties that one integer is one more than twice the other and that the two integers sum to 34. What is larger of the two numbers?

(A) 23   (B) 20   (C) 14   (D) 27   (E) None of the above

13. Solve for t given that $|2t + 6| = 30$.

(A) $t = 12$ (B) $t = -36$ or 24 (C) $t = 24$ (D) $t = -18$ or 12 (E) None of the above

14. The sum of the reciprocals of two positive numbers is $27/10$ and their product is $5/3$. What is the sum of the two numbers?

(A) $27/10$ (B) $9/2$ (C) $9/4$ (D) $t = -18, 12$ (E) None of the above

15. What is the value of $35^2 - 25^2$?

(A) 625   (B) 600   (C) 3600   (D) 100   (E) None of the above

16. Which of the listed integers is biggest?

(A) 2^{2015} (B) 20^{15} (C) 200^{200} (D) 2015^2 (E) 2015^{100}

17. How many points of intersection do the graphs of the equations $y = 3x^2 + 1$ and $y = x^3 + 3x$ have in the xy-plane?

(A) 0   (B) 1   (C) 2   (D) 3   (E) None of the above

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18. How many seconds are there in one day?

    (A) 3600   (B) 1440   (C) 86400   (D) 216000   (E) None of the above

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19. How many positive two-digit integers are there that are not multiples of 3?

    (A) 30   (B) 31   (C) 60   (D) 61   (E) None of the above

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20. Which of the following fractions is smallest?

    (A) 7/16   (B) 4/7   (C) 8/15   (D) 3/4   (E) 9/17

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21. The graph of $y = 7 - (x+1)^2$ does not pass through which of the quadrants in the xy-plane?

    (A) I   (B) II   (C) III   (D) IV   (E) None of the above

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22. What is the last digit of the number 2^{2015}?

    (A) 0   (B) 2   (C) 4   (D) 6   (E) 8

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23. Solve for x if $(10^x)^3 = .000001^2$.

    (A) $-10/3$ (B) -4 (C) $-14/3$ (D) -3 (E) None of the above.

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24. Find the minimum value of $1 \circ 2 \circ 3 \circ 4 \circ 5 \circ 6 \circ 7 \circ 8 \circ 9$ where each "$\circ$" represents either "$+$" (addition) or "$\cdot$" (multiplication).

    (A) 36   (B) 40   (C) 44   (D) 45   (E) None of the above.