OU Math Day 2002

ALGEBRA 1 TEST

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1. If $f(x) = 3x^4 - 2x^2 + 4x - 15$, what is $f(3)$?

   (A) 12 (B) 60 (C) 222 (D) 225 (E) None of the above.

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2. Which of the following equals $\frac{1}{3} + \frac{1}{7}$?

   (A) $\frac{1}{10}$ (B) $\frac{1}{5}$ (C) $-\frac{1}{5}$ (D) $\frac{1}{21}$ (E) None of the above.

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3. What is the justification for the following equality?

$$b + c = c + b$$

   (A) distributive law (B) associative law of addition (C) commutative law of addition (D) closure for addition of real numbers (E) None of the above.

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4. What is the slope of the line $\frac{5}{2}x + \frac{3}{2}y = \frac{49}{10}$?

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

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5. If $3x - 4 = 0$ then what does x equal?

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

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6. If $3x - 4y = 10$ and $y - 4x = 0$, then what is y?

   (A) $-40/13$ (B) $-10/13$ (C) 10/13 (D) 5/26 (E) None of the above.

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7. Simplify $16^{-3/4}$

   (A) -12 (B) -8 (C) $-1/8$ (D) 1/8 (E) None of the above.

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8. The total number of prime divisors of the natural number 2002 is:

   (A) 2 (B) 3 (C) 4 (D) 5 (E) None of the above.

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9. What is the product of the roots of $2x^2 + 5x - 3 = 0$

   (A) 2 (B) -2 (C) $3/2$ (D) $-3/2$ (E) None of the above.

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10. Tom, Bill, and Brian order two large pizzas. Tom eats two slices, while Bill and Brian both have three. If two-thirds of the total amount of pizza is remaining and assuming each of the slices represents an equal portion of the pizza, how many slices were originally in each pizza?

    (A) 30 (B) 24 (C) 18 (D) 12 (E) None of the above.

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11. What is the distance between the points $(-2, 5)$ and $(3, 8)$?

    (A) $\sqrt{10}$ (B) $\sqrt{35}$ (C) 6 (D) $\sqrt{34}$ (E) None of the above.

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12. Which one of the following is NOT a prime number?

    (A) 101 (B) 89 (C) 121 (D) 127 (E) 131

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13. One long-distance provider charges a \$1.00 connection fee, and \$.04/minute, and another charges a flat \$.05/minute, with no connection fee. A third provider charges \$.03/minute for the first ten minutes, and \$.06/minute for every minute after that, with no connection fee. What is the difference in price between the cheapest and most expensive providers for a twenty-minute call?

    (A) \$0.90 (B) \$0.80 (C) \$0.20 (D) \$0.10 (E) None of the above.

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14. If $g(x, y) = x^y - y^{xy}$, what is $g(2, 3)$?

    (A) -721 (B) -720 (C) -55 (D) -50 (E) None of the above.

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15. The slope of the line joining $(2, 4)$ and $(-1, 1)$ is:

    (A) 4 (B) $1/4$ (C) -2 (D) $-1/2$ (E) None of the above.

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16. Factor $4x^2 - 81$.

    (A) $-(9 - 2x)^2$ (B) $2(2x - 9)(x + 9)$ (C) $(2x - 9)(2x + 9)$ (D) $(x - \frac{9}{2})(x + \frac{9}{2})$ (E) None of the above.

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17. What is the degree of the polynomial $x(x + 1)(x^2 + 1)(x^3 + 1)$?

    (A) 3 (B) 4 (C) 7 (D) x^2 (E) None of the above.

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18. A teacher has a system of awarding cards to his students to reward good scores on tests. For each score between 80 and 90, the student receives a white card. For each score between 91 and 100, the student receives a yellow card. Two white cards can be traded in for a yellow card. Five yellow cards can be traded in for a blue card. Three blue cards can be traded in for a five pieces of candy. What is the price of each piece of candy in white cards?

(A) 4 (B) 5 (C) 6 (D) 7 (E) None of the above.

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19. Which is bigger $(2/3)^{50}$ or $(3/2)^{1/50}$?

(A) $(2/3)^{50}$ (B) $(3/2)^{1/50}$ (C) They are equal.

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20. Find the roots of $x^4 - 17x^2 + 16 = 0$.

(A) $-1, 4$ (B) $1, 4$ (C) $\pm 1, \pm 4$ (D) $-1, -4$ (E) None of the above.

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21. A man is presently nine times as old as his son is. In 9 years, he will be three times as old as his son. How old is the son now?

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

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22. If $\dfrac{2}{3-x} = \dfrac{4}{9}$, then what is x?

(A) $-3/2$ (B) $3/2$ (C) $2/3$ (D) $-2/3$ (E) None of the above.

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23. What are the factors of $x^3 - 8$?

(A) $(x-2)$ and (x^2+4) (B) (x^2-2) and $(x+4)$ (C) $(x-2)$ and (x^2+2x+4)
(D) $(x-2)$ and (x^2+4x+4) (E) None of the above.

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24. The product of two numbers is 378 and their sum is 39. What is the absolute value of the difference between the two numbers?

(A) 3 (B) 5 (C) 7 (D) 9 (E) None of the above.

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25. The least common multiple of $51x^2yz^3$ and $34x^3z$ is:

(A) $17x^2z$ (B) $102x^3yz^3$ (C) $17x^3yz^3$ (D) $6xyz^2$ (E) None of the above.
