OU Math Day 2011

Algebra 1 Test

(with answers on the last page)

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1. In simplest form $4(x^3 - x^2 + 2) + 2(x^2 - x - 6) - (3x^3 + 2x^2 - x)$ equals

   (A) $7x^3 - 3x - 4$ (B) $x^3 - 4x^2 - x - 6$ (C) $x^3 - 3x - 4$
   (D) $x^3 - 4x^2 - 9$ (E) None of the above

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2. How many real solutions for x does the equation $x^2 = 27$ have?

   (A) 0 (B) 1 (C) 2 (D) 4 (E) None of the above

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3. Which of the five listed numbers is smallest?

   (A) $\frac{3}{7}$ (B) $\frac{1/3}{7}$ (C) $\frac{3}{1/7}$ (D) $\frac{1/3}{1/7}$ (E) 3

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4. If $1 + 2z = 5z - 2$ then z equals

   (A) 1 (B) 0 (C) $-\frac{1}{5}$ (D) -1 (E) None of the above

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5. The numerator of the rational number $\frac{1}{2010} - \frac{1}{2011}$ written in reduced form is

   (A) 2011 (B) -3 (C) 670 (D) 1 (E) None of the above

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6. Which of the following is a possible value for a positive number x which satisfies $1/x > x$?

(A) 3/2 (B) 1/2 (C) 1 (D) 17 (E) None of the above

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7. The average of two positive numbers is 8 and their product is 48. What are the values of the two numbers?

(A) 6 and 8 (B) 6 and 10 (C) 3 and 16 (D) 4 and 12 (E) None of the above

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8. What is the value of $x^3 - x^2 - x$ when $x = -2$?

(A) -2 (B) -10 (C) 0 (D) 6 (E) None of the above

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9. Which of the following is a factor of $x^5 + x^4 - 2x^3 - 2x^2 + x + 1$?

(A) $x + 1$ (B) $x - 2$ (C) x (D) $x + 2$ (E) None of the above

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10. Find the greatest common divisor of 2011 and 2010.

(A) 4042110 (B) 11 (C) 1 (D) 67 (E) None of the above

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11. Which is the closest integer to 2011 which is a perfect square?

(A) 1936 (B) 2000 (C) 2020 (D) 2025 (E) None of the above

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12. The reciprocal of $\frac{1}{3} - \frac{1}{7}$ equals

(A) 4/21 (B) 10/21 (C) -4 (D) 21/4 (E) None of the above

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13. Five less than eleven times a number is eleven more than five times the number. What is the number?

(A) 1 (B) 8/3 (C) 5/11 (D) 5/44 (E) None of the above

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14. Three cousins Amy, Bob and Carla are related in age as follows. Carla's age is 5 years less than twice Amy's. The sum of Bob and Carla's ages is 17. Amy is two years older than Bob. How old is Carla?

(A) 6 (B) 8 (C) 10 (D) 11 (E) None of the above

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15. The expansion of $(x-3)^2$ as a quadratic polynomial is

(A) $x^2 - 6x - 9$ (B) $x^2 - 6x + 9$ (C) $x^2 + 6x - 9$
(D) $x^2 + 6x + 9$ (E) None of the above

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16. The expansion of $(x-3)^3$ as a degree 3 polynomial is

(A) $x^3 - 9x^2 + 27x - 27$ (B) $x^3 - 3x^2 + 3x - 1$ (C) $x^3 - 9x^2 + 9x + 27$
(D) $x^3 + 9x^2 - 27x - 27$ (E) None of the above

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17. The equation $x^4(x-7)(x^2-4)(x^2-13)^3(x+5)^2 = 0$ has seven distinct real solutions. What is the sum of all seven of these solutions?

(A) 0 (B) $2\sqrt{2}$ (C) $-2\sqrt{2}$ (D) 2 (E) None of the above

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18. The rule of arithmetic that asserts that $a+b = b+a$ for all numbers a and b is called the

(A) law of the additive inverse (B) associative law for multiplication
(C) commutative law for addition (D) distributive law (E) None of the above

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19. The sixth power of a positive number equals the cube of 1 million. What is the number?

(A) 100 (B) 1000 (C) 10^{12} (D) 1000000 (E) None of the above

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20. Which of the following is a factorization of $6x^2 - 13x - 5$?

(A) $(3x-1)(2x+5)$ (B) $(x+1)(6x-5)$ (C) $(2x-1)(3x+5)$
(D) $(3x+1)(2x-5)$ (E) None of the above

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21. A bicyclist rides for 10 miles against the wind then turns around and travels the same 10 miles in reverse direction. If the rider averages 20 miles per hour on the first leg of the trip and 10 miles per hour on the second leg, what is the average speed for the entire trip?

(A) $16\frac{2}{3}$ miles/hour (B) 18 miles/hour (C) $13\frac{1}{3}$ miles/hour
(D) 15 miles/hour (E) None of the above

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22. Determine the smallest positive integer which has a remainder of 1 when divided by 7, a remainder of 2 when divided by 11.

(A) 211 (B) 29 (C) 79 (D) 134 (E) None of the above

ANSWERS:

1. E
2. C
3. B
4. A
5. D
6. B
7. D
8. B
9. A
10. C
11. D
12. D
13. B
14. D
15. B
16. A
17. D
18. C
19. B
20. D
21. C
22. E