OU Math Day 2017

Algebra II Test

(with answers on the last page)

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1. The square root of 8 more than a positive whole number equals 45. What is the number?

   (A) 1369 (B) $\sqrt{53}$ (C) 253 (D) 2025 (E) None of the above

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2. On a 25-question test, a student scores four points for each correct answer and loses two points for each incorrect answer. Jacki answered all but two questions on the test and obtained a score of 68 points. How many questions did she answer correctly?

   (A) 6 (B) 17 (C) 18 (D) 19 (E) None of the above

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3. Let x and y be numbers which satisfy the equations: $x - 2y = 1$ and $2y + 3x = 74$. What must x equal?

   (A) 5/2 (B) 202/7 (C) 23 (D) 94 (E) None of the above

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4. All of the solutions to the equation $x^2 = 36$ are:

   (A) $x = \sqrt{6}$ (B) $x = 6$ (C) $x = 0$ and $x = 6$ (D) $x = 6$ and $x = -6$
   (E) None of the above

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5. Among the five rational numbers $\frac{5}{11}$, $\frac{4}{13}$, $\frac{5}{12}$, $\frac{6}{19}$ and $\frac{4}{12}$ which is the smallest?

   (A) $\frac{5}{11}$ (B) $\frac{4}{13}$ (C) $\frac{5}{12}$ (D) $\frac{6}{19}$ (E) $\frac{4}{12}$

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6. Which of the following statements are true for all real numbers a, b and c?

i. $\sqrt{a^2+b^2} = a+b$

ii. $\dfrac{ab+c}{c} = b+c$

iii. $(a+b)^2 = a^2+b^2$

iv. $a(b+c) = ab+c$

v. $\sqrt{a^2} = a$

(A) i only (B) ii and iv only (C) iii only (D) all are true (E) none are true

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7. The quadratic polynomial $10x^2+25x-15$ factors as:

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

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8. Which of the following is **NOT** equal to $\frac{2}{5}+\frac{3}{12}$?

(A) $\frac{1}{10}+\frac{11}{20}$ (B) $\frac{1}{2}+\frac{3}{20}$ (C) $\frac{5}{4}-\frac{3}{5}$ (D) $\frac{1}{3}+\frac{19}{60}$ (E) None of the above

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9. What is the units digit of 13^{2017}?

(A) 1 (B) 3 (C) 7 (D) 9 (E) None of the above

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10. Michael' s eleven digit telephone number equals the square of $111,111$. Given that he lives in the USA, what is his area code?

(A) 673 (B) 234 (C) 111 (D) 405 (E) None of the above

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11. How many distinct real number solutions does the equation

$$x^2(2x+3)(x^2+4)(x^2+2x-15)(x^2+3x-18)^2(x^2+3x+18)=0$$

have?

(A) 10 (B) 8 (C) 6 (D) 5 (E) None of the above

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12. All solutions to the equation $\sqrt{2-x}=x-1$ are $x=$?

(A) $\frac{1+\sqrt{5}}{2}$ (B) $\frac{1\pm\sqrt{5}}{2}$ (C) $\frac{3\pm\sqrt{13}}{2}$ (D) $\frac{3\pm\sqrt{21}}{4}$ (E) None of the above

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13. How many seven-digit positive whole numbers are there whose digits are strictly decreasing in value when read from left to right?

(A) 36 (B) 72 (C) 84 (D) 120 (E) None of the above

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14. Consider an equation of the form $2x^2 + bx + c = 0$ where b and c are integers. If the sum of the two solutions for x is 5 and their product is 6 then what must c equal?

(A) -5 (B) 3 (C) 6 (D) 12 (E) None of the above

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15. If $3 \cdot 3^x = 9^{x^2} \cdot 27^{x-1}$ then x must equal:

(A) $-\frac{2}{3}$ (B) 0 (C) -2 or 1 (D) 1 or 0 (E) None of the above

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16. The graph of $y = x^2 - 4x - 23$ in the rectangular coordinate plane does **NOT** pass through which of the four quadrants?

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

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17. Which of the following equals

$$\frac{1}{\sqrt{12}+\sqrt{4}} + \frac{1}{\sqrt{20}+\sqrt{12}} + \frac{1}{\sqrt{28}+\sqrt{20}} + \frac{1}{\sqrt{36}+\sqrt{28}} \; ?$$

(A) 1 (B) $\sqrt{44}$ (C) 4 (D) 1/2 (E) None of the above

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18. A **twin prime** is a prime number that is either 2 less or 2 more than another prime number. Is 2017 a twin prime?

(A) Yes (B) No

19. How many positive integer divisors does 24^4 have (including 1 and 24^4 itself)?

(A) 32 (B) 48 (C) 59 (D) 65 (E) None of the above

20. If $x = 2.9999$ what whole number is nearest to the value of $\dfrac{x^3 + 2x^2 - 8x - 21}{x - 3}$?

(A) 0 (B) 14 (C) 31 (D) ∞ (E) None of the above

21. Reading from right to left, what is the first non-zero digit in 25!?

(A) 1 (B) 2 (C) 4 (D) 5 (E) None of the above.

Answers for the 2017 Algebra II Test:

1-5:	EDEDB
6-10:	EAEBB
11-15:	DBDDC
16-20:	EDBDC
21:	C
