OU MATHDAY 2001
HIGHER ALGEBRA TEST

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1. Solve this system of equations:

$$\begin{aligned} 9x + 21y &= -11 \\ 8x + 6y &= -4/3 \end{aligned}$$

(a) $(5/3, 2/3)$; **(b)** $(-1/3, -2/3)$; **(c)** $(1/3, -2/3)$; **(d)** $(-5/3, 2)$;

(e) $(5/3, -2)$.

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2. Find the solution set of $|2x - 1| \geq 5$

(a) $\{x : x \leq 2\}$; **(b)** $\{x : x \geq 3\}$; **(c)** $\{x : x \leq -2\} \cap \{x : x \geq 3\}$;

(d) $\{x : x \leq -2\} \cup \{x : x \geq 3\}$; **(e)** The empty set.

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3. Find the simplest radical form of $3\sqrt{6} \cdot \sqrt{15}$

(a) $6\sqrt{10}$; **(b)** $27\sqrt{10}$; **(c)** $9\sqrt{10}$; **(d)** $12\sqrt{10}$;

(e) None of these.

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4. Given the line whose equation is $2x - 3y = 6$. Where does the point $P(-5, -6)$ lie?

(a) in the halfplane above the line
(b) in the halfplane below the line
(c) on the line
(d) all of the above
(e) none of the above

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5. Which of the following describes the graph of the given set

$$\{(x, y) : x^2 + y^2 \leq 25\} \cap \{(x, y) : x + y = -5\}$$

(a) a point; **(b)** a segment; **(c)** a ray; **(d)** a line; **(e)** none of these.

6. Find the numerical coefficient of the term in x^4 in the expansion of $(x-2)^6$.

(a) - 500; **(b)** 120; **(c)** 60; **(d)** 480; **(e)** none of these.

7. Simplify completely $\dfrac{a^2-7a+10}{a^2-2a-3} \div \dfrac{a-2}{a-3}$.

(a) -5; **(b)** 5; **(c)** $\dfrac{a-5}{a+1}$; **(d)** $\dfrac{a+5}{a+1}$; **(e)** none of these.

8. If f is an even function then the graph of f is symmetric with respect to:

(a) the x-axis; **(b)** the y-axis; **(c)** the line $y=x$; **(d)** the line $y=-x$;

(e) cannot be determined.

9. Simplify completely: $(3x^2-2x)-(x^4-2x-1)+(5x^2-2)$.

(a) $-(x^4-8x^2+1)$; **(b)** $-x^4+8x^2-4x-3$; **(c)** $7x^2-1$; **(d)** x^4+8x^2+1;

(e) none of these.

10. Which of the following is a false statement?

(a) $\left((-9)^2\right)^{1/3} = \left((-9)^{1/3}\right)^2$; **(b)** $\left((-2)^3\right)^{1/3} = \left((-2)^{1/3}\right)^3$;

(c) $\left((-9)^{1/2}\right)^2 = \left((-9)^2\right)^{1/2}$; **(d)** $\left((-16)^{-2}\right)^{1/3} = \left((-16)^{1/3}\right)^{-2}$;

(e) $\left((-8)^2\right)^{1/3} = \left((-8)^{1/3}\right)^2$.

11. Find the inverse relation of $y=(3/2)x-9$

(a) $y=(2/3)x+18$; **(b)** $x=(2/3)y+6$; **(c)** $y=(2/3)x+6$;

(d) $2y=3x-18$; **(e)** $x=(3/2)y-9$.

12. If the distance from $(2,b)$ to $(-3,5)$ is $\sqrt{74}$, find all possible values of b.

(a) $-2\pm 2\sqrt{13}$; **(b)** $-5\pm 3\sqrt{11}$; **(c)** $5\pm 2\sqrt{73}$; **(d)** -2 or 12;

(e) 2 or - 12.

13. If $x<0$, which of the following must be true?

(a) $x-3<3x$; **(b)** $x-3<3-x$; **(c)** $-3x<x^2$; **(d)** $x^3>x+3$;

(e) none of these.

14. Find the product of x and y if

$$(x+2y)+(4x-3y)\mathbf{i}=(2x-1)+(y-6)\mathbf{i}$$

(a) - 8; **(b)** 8; **(c)** -10; **(d)** 10; **(e)** 0.

15. If $y=x^2$ and x increases from -5 to 5, then y will:

(a) increase; **(b)** decrease; **(c)** increase then decrease;

(d) decrease then increase; **(e)** remain constant.

16. Solve: $\left|\dfrac{4p-1}{2}\right|<6$.

(a) $-1/2<p<1$; **(b)** $-1<p<1$; **(c)** $-13/4<p<13/4$;

(d) $-13/4<p<11/4$; **(e)** $-11/4<p<13/4$.

17. If $x+y=9$ and $y-x=7$, find x^2+y^2.

(a) 8; **(b)** 1; **(c)** 9; **(d)** 64; **(e)** 65.

18. The absolute value of the reciprocal of the difference of the reciprocals of two consecutive odd positive integers is 3/2. Find the sum of these two integers.

(a) 4; **(b)** 6; **(c)** 8; **(d)** 10; **(e)** the integers do not exist.

19. A binomial factor of b^3+b^2+b+1 is:

(a) $b+1$; **(b)** $b-1$; **(c)** b^2+10; **(d)** b^2-1; **(e)** b^2+2.

20. If $2y-6$ varies directly as the square of $x+2$ and inversely as $z-3$, and if $y=1$ when $x=2$ and $z=11$, find y when $x=4$ and $z=9$.

(a) - 3; **(b)** - 2; **(c)** - 9; **(d)** -12; **(e)** none of these.

21. If x is a real number, then compare 1^{3x+1} and 1^{3x}.

(a) $1^{3x+1}>1^{3x}$; **(b)** $1^{3x+1}<1^{3x}$; **(c)** $1^{3x+1}=1^{3x}$;

(d)none of the above; **(e)** cannot be determined from the information given.

22. If $f(x)=x^4+2x^3-x^2+cx+k$, $f(-2)=20$ and $f(2)=24$, find $c-k$.

(a) -27; **(b)** -17; **(c)** 0; **(d)** 17; **(e)** 27.

23. If $\dfrac{3}{2+\frac{x+3}{3}} = \dfrac{3}{4}$, then what is the value of x?

(a) - 3; **(b)** - 2; **(c)** 0; **(d)** 3; **(e)** 2.

24. For which equation is the sum of its two solutions greater than their product?

(a) $x^2 - 7x + 12 = 0$; **(b)** $x^2 + 9x - 10 = 0$; **(c)** $x^2 + 8x = 0$;

(d) $x^2 + 4 = 0$; **(e)** none of these.

25. If n is a rational number, which of the following must be rational numbers?

I. $100n$; **II.** $\dfrac{n}{100}$; **III.** $n + 100$.

(a) I only; **(b)** I and II only; **(c)** II and III only; **(d)** I, II, and III;

(e) none of the choices.

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1. a, b and c are solutions of the equation $x^3 - 2x^2 - 5x + 6 = 0$. Find the value of $a^2b^2c + ab^2c^2 + a^2bc^2$.

A. -216; **B.** 30; **C.** 60; **D.** 66; **E.** none of these.

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2. Solve for x:

$$\log_3(x+1) + 2\log_9(3x-1) - 2\log_3(x+2) = 1$$