1. Which one of the following statements is FALSE?

(a) $x^2 = 4$ and $x = 2$ are equivalent equations.

(b) The equation $\dfrac{x+3}{x+1} = \dfrac{2}{x+1}$ has no solution.

(c) $(x^2 - 4) - (x+2)(x-2) = 0$ is an identity.

(d) $(x+3)^2 = x^2 + 9$ is a conditional equation.

(e) $\dfrac{4x+7}{4} = x + 7$ is a contradiction.

See # 23 to 28 p. 70

2. Identify the property of equality that is illustrated by the statement

If $2x - y = z$ and $z = 13$, then $2x - y = 13$

(a) The transitive property

(b) The reflexive property

(c) The symmetric property

(d) The closure property

(e) The distributive property

See example 4 p. 6 and # 25 to 38 p. 8

3. The coefficient of x^2y in the expression $\left(\frac{1}{2}x - \frac{1}{3}y\right)^3$ is equal to

(a) $-\frac{1}{4}$

(b) $-\frac{3}{4}$

(c) $\frac{3}{4}$

(d) $-\frac{9}{4}$

(e) $-\frac{1}{36}$

See # 80 to 85 p. 37

4. If x is any nonzero real number, then one of the following statements is always TRUE:

(a) $\sqrt[3]{-x}$ is a real number

(b) $\frac{2}{x}$ is a rational number

(c) x^2 is a rational number

(d) $-x$ is a negative number

(e) $4x$ is a composite number

5. If $x < 0$, then the expression

$$\left|\frac{10+2x}{|x|-|2-x|}\right|$$

simplifies to

(a) $|5+x|$

(b) $5-x$

(c) $\dfrac{5+x}{1-x}$

(d) $\left|\dfrac{5+x}{1-x}\right|$

(e) $x-5$

see example 2 p.14 and #59, 60 p.16

6. If x and y are nonzero real numbers, then the expression

$$\frac{[(25)^{-1}x^4y^{-2}(xy^{-2})^0]^{-\frac{1}{2}}}{[(-125)^{-1}x^{-9}y^3]^{-\frac{1}{3}}}$$

simplifies to

(a) $-\dfrac{y|y|}{x^5}$

(b) $-y\left|\dfrac{y}{x}\right|$

(c) $\dfrac{5y|y|}{x}$

(d) $-\dfrac{25|xy|}{x^5}$

(e) $\dfrac{1}{25x^5}$

see example 2 p.22 and # 32, 41, 42 p.28

7. The set of all real numbers x for which $1 < x \leq 8$ and $|2x - 5| \geq 1$ is given by the interval

(a) $(1, 2] \cup [3, 8]$

(b) $[2, 3]$

(c) $(1, 3]$

(d) $[2, 3] \cup [6, 8]$

(e) $(1, 3] \cup [6, 8]$

See examples 2 p.110, 4 p.111 & #11 to 20, 21 to 36 p.117

8. $\dfrac{5\sqrt{5}}{2 + \sqrt{5}} =$

(a) $5(5 - 2\sqrt{5})$

(b) $5(2 - 5\sqrt{5})$

(c) $5(5 + 2\sqrt{5})$

(d) $2 + 5\sqrt{5})$

(e) $\dfrac{5}{3}$

See #109 to 112 p.20

9. The sum of all solutions of the equation

$$x^{\frac{2}{3}} + 2x^{\frac{1}{3}} - 3 = 0$$

is equal to

(a) -26

(b) 25

(c) -21

(d) 29

(e) -2

Similar to example 7 p.104 and # 31 to 40 p.105

10. If P and Q are two polynomials of degree 4, then one of the following statements is TRUE:

(a) $P+Q$ is a polynomial of degree ≤ 4

(b) $P \cdot Q$ is a polynomial of degree 16

(c) $\dfrac{1}{P}$ is a polynomial of degree -4

(d) $\dfrac{P+Q}{P}$ is a polynomial of degree 4

(e) $\dfrac{P}{Q}$ is a polynomial of degree 1

Topics of discussions p.35

11. Use the discriminant to determine that the equation

$$\frac{1}{3}x^2 - \frac{1}{4}x + \frac{1}{5} = 0$$

has

(a) two distinct nonreal complex roots

(b) two equal positive roots

(c) two equal negative roots

(d) one positive root and one negative root

(e) two equal nonreal roots

Similar to example 9 p.93 and problems 77 to 82 p.96

12. The expression

$$(4x - 5y)(4x + 5y) - (2x - 3y)(3x + 2y)$$

simplifies to

(a) $10x^2 + 5xy - 19y^2$

(b) $10x^2 + 4xy - 21y^2$

(c) $8x^2 - 16y^2$

(d) $10x^2 - 19y^2$

(e) $22x^2 - 5xy - 19y^2$

See examples 2, 3 p. 32, 33 and # 23 to 48 p. 36

13. Completing the square on $5x^2 - 30x + 49 = 0$ gives $(x + a)^2 = b$ where $a \cdot b$ is equal to

(a) $\frac{12}{5}$

(b) $\frac{36}{5}$

(c) $\frac{294}{5}$

(d) $\frac{282}{5}$

(e) $-\frac{4}{25}$

Similar to example 7 p-90 and # 51 to 64 p. 96

14. One factor of $y^6 - 7y^3 - 8$ is

(a) $y^2 + 2y + 4$

(b) $y^2 - 4y + 4$

(c) $y^2 - 2y + 8$

(d) $y^2 - 2y + 1$

(e) $y^2 - y + 1$

See example 9 p. 46

15. If $i = \sqrt{-1}$, then the expression

$$\frac{3i^{90} - 9i^{92}}{2i^{89} - 4i^{91}}$$

simplifies to

(a) $2i$

(b) i

(c) $-i$

(d) $\frac{1}{2}i$

(e) $-\frac{1}{2}i$

powers of i and $\frac{1}{i} = -i$

16. Factoring $x^2 - z^2 + 14xy + 49y^2$ gives

(a) $(x + 7y - z)(x + 7y + z)$

(b) $(x - 7y - z)(x + 7y + z)$

(c) $(x + 7y - z)(x - 7y + z)$

(d) $(x + 7y - z)^2$

(e) $(x + 7y - z)(x - 7y - z)$

See example 8 p.45 and # 73, 74 p.48

17. The complex number $\dfrac{4+5i}{2-3i}$ written in standard form is

(a) $\dfrac{7}{13}+\dfrac{22}{13}i$

(b) $-\dfrac{7}{13}-\dfrac{4}{13}i$

(c) $2-\dfrac{5}{3}i$

(d) $-\dfrac{9}{13}+\dfrac{22}{13}i$

(e) $-\dfrac{1}{13}+\dfrac{22}{13}i$

see example 5 p-88 and problems # 35 to 40 p. 96

18. If $\dfrac{A}{B}=\dfrac{y-x}{x-z}$, then x is equal to

(a) $\dfrac{Az+By}{A+B}$

(b) $\dfrac{Az-By}{A-B}$

(c) $\dfrac{Ay+Bz}{A+B}$

(d) $\dfrac{Ay-Bz}{A-B}$

(e) $\dfrac{A+B}{Ay+Bz}$

Similar to example 1 p. 73 and # 15 to 18 p. 79

19. The expression

$$\frac{xy^{-1} - yx^{-1}}{x^2y^{-1} - y^2x^{-1}}$$

simplifies to

(a) $\frac{x+y}{x^2+xy+y^2}$

(b) $\frac{1}{x+y}$

(c) $\frac{1}{x-y}$

(d) $\frac{xy}{x+y}$

(e) $\frac{xy}{x^2-xy+y^2}$

See examples 4, 5 p. 54 and # 53 to 56 p. 57

20. The sum of all solutions of the equation

$$\frac{|x-1|+2}{1+|x-1|} - \frac{3}{2} = 0$$

is equal to

(a) 2

(b) 0

(c) 1

(d) -5

(e) 1

See example 6 p-68 and # 45 to 60 p. 70

21. The solution set of the inequality

$$\frac{2 - x^2}{x} \leq 1$$

in interval notation is equal to

(a) $[-2, 0) \cup [1, \infty)$

(b) $(0, 1]$

(c) $(-\infty, -2] \cup [1, \infty)$

(d) $[-2, 0) \cup (0, 1]$

(e) $(-\infty, -1] \cup [2, \infty)$

See example 6 p. 114 and problems 47 to 62 p. 11

22. The length of a rectangle is 20 feet more than twice its width. If the perimeter of the rectangle is 220 feet, then the length is equal to

(a) 80 feet

(b) 65 feet

(c) 105 feet

(d) 90 feet

(e) 70 feet

See example 2 p. 74 and # 21, 22 p. 79

23. The expression

$$12\sqrt[3]{4} - \frac{20}{\sqrt[3]{16}}$$

simplifies to

(a) $7\sqrt[3]{4}$

(b) $-5\sqrt[3]{4}$

(c) $11\sqrt[3]{4}$

(d) $16\sqrt[3]{4}$

(e) $-8\sqrt[3]{4}$

See example 4 p. 25 and # 79-86, # 97 to 104 of p. 28
example 6 p. 26

24. The equation

$$5 + 3x + \sqrt{5 + 3x} = 0$$

has

(a) only one negative rational root

(b) two negative rational roots

(c) only one positive rational root

(d) two positive rational roots

(e) no real roots

Similar to #16 p. 105 and example 3 p. 101

25. The expression

$$\frac{5}{2x^2+3x-2} - \frac{3}{2x^2+x-1}$$

simplifies to

(a) $\dfrac{1}{(x+1)(x+2)}$

(b) $\dfrac{2}{(2x-1)(x+1)}$

(c) $\dfrac{2}{(2x-1)^2(x+1)(x+2)}$

(d) $\dfrac{x}{(x+1)(x+2)}$

(e) $\dfrac{4}{(x+1)(x+2)}$

$\boxed{\text{see example 3 p.52 and \# 31, 32, 37, 38 p.56}}$