College and Advanced Algebra | Nueva Vizcaya State University | Midterm Exam
O. D. Hombrebueno | College of Teacher Education | October 12, 2018

Name: _____

Course and Year: _____

Part 1. Insert $\in$ or $\notin$ in the blank to make the statement correct.

1. 15____N 2. 1.4142____H 3. 0____Q 4. 2007____J 5. -5____H

Part 2. Use the symbol $\subseteq$ to give a correct statement involving the two sets.

1. N and Q 2. R and Q 3. J and N 4. H and R 5. 0 and J

Part 3. Determine which of the sets N, J, Q, H, R, and $\emptyset$ is equal to the given set.

1. $Q \cap R$ 2. $H \cap R$ 3. $Q \cup R$ 4. $H \cap Q$ 5. $J \cap N$

Part 4. Use set builder notation and one or more of the symbols $<$, $>$, $\leq$, and $\geq$ to denote the set.

1. The set of all y between -12 and -3.
2. The set of all y such that y is greater than or equal to -26 and less than -16.
3. The set of all x such that $2x + 4$ is nonnegative.
4. The set of all a such that $a - 2$ is greater than -5 and less than or equal to 7.
5. The set of all z such that $2z + 5$ is between and including -1 and 15.

Part 5. Show the set on the number line and represent the set by interval notation.

1. $\{x| -4 < x \leq 4\}$
2. $\{x|x > 2 \text{ and } x < 12\}$
3. $\{x|x < 3 \text{ or } x > 6\}$
4. $\{x|x \geq -5\} \cap \{x|x \leq 5\}$
5. $\{x|x > 2\} \cup \{x|x > 10\}$

Part 6. Write the number without absolute value bars.

1. $|3 - \sqrt{3}|$ 2. $\left|-\frac{3}{4}\right|$ 3. $\left|\frac{1}{3}\right|$ 4. $|-8|$ 5. $|3 - \pi|$

Part 7. Use laws of exponents to write the expression so that each variable occurs only once and all the exponents are positive. None of the denominators is zero.

1. $a^{-3} \cdot a^6$
2. $\dfrac{y^5}{y^{-7}}$
3. $(s^5 t^{-1})^{-2}$
4. $\left(\dfrac{x^{-1}}{y^3}\right)^{-4}$
5. $-7(-x^6 y)(-x^6 y^5)$
6. $(2x^2)^3(3y^3)^2$
7. $(4s^4)^4(2t^3)^3$

8. $\dfrac{(20r^2s^3t^4)(2r^2s^2t)}{(-4rst)(3rs^4t^2)}$

9. $\dfrac{3^{-2}x^{-4}y^0}{(3x^2y^3)^{-4}}$

10. $\left(\dfrac{3x^{-1}y^2z^3}{2x^{-3}y^{-2}z^{-1}}\right)^{-1}$

Part 8. Simplify the algebraic expression. For items 8, 12, and 23, n is a positive integer. For items 21-25, none of the divisor is zero. Show your solution if appropriate.

1. $4x^2 - 5x + 6x^2 - 2x$
2. $2(3u - 4v) - (5u - 3v)$
3. $3(-t^2 + 3st - 2s^2) - 2(7t^2 - st - s^2)$
4. $3(2w - 3z) - [w - z - (w + z)]$
5. $(4x^3 - 7x^2 + 2x - 4) + (3x^3 + 8x^2 + 3x - 7)$
6. $-(4z^5 - 6z^3 + z - 8) - (2z^5 + 7z^4 - z^2 + 4z + 1)$
7. $2xyz^2(3xz - 6yz - xy - 1)$
8. $3x^{2n}(x^{n+1} - 4x^n + 5)$
9. $(y + 8)(4y - 3)$
10. $(2x^2 - 5y^2)(-3x^2 + y^2)$
11. $(b - 3b^2 + 7)(5b^2 + 2 - 3b)$
12. $(3x^{2n} + y^n)(4x^{2n} - 5y^n)$
13. $(y - 2)(y + 7)$
14. $(5t + 4)^2$
15. $(w + 6)(w - 6)$
16. $(6x - y)(3x + 2y)$
17. $(t^2 - 5)(t^2 + 9)$
18. $(4x^2 - 3y^2)^2$
19. $(3r - 10s)(3r + 10s)$
20. $(7a^2 - 2b^2)(5a^2 + 3b^2)$
21. $\dfrac{-48y^3 + 30y^2 - 18y}{6y}$
22. $\dfrac{-24a^3b^3c^4 + 32a^2b^4c^2 - 16a^5b^3c^3}{8a^2b^2c^2}$
23. $\dfrac{16t^{4n} - 64t^{6n}}{2t^{2n}}$
24. $\dfrac{a^3 - 3a^2 - a + 3}{a - 2}$
25. $\dfrac{t^3 - 7t - 6}{t + 2}$

Part 9. Factor the polynomials. For items 1, 2 and the bonus item, n is a positive integer. Show your solution if appropriate

1. $a^{2n+1} + a^{n+2} + a^{n+1}$
2. $b^{2n} - c^{8n}$
3. $y^2 - 10y + 25$
4. $10y^2 - 11y - 6$
5. $27 - x^3$
6. $x^3 + 3x^2 + x + 3$
7. $6st^2 - 9s^2t - 2t^3 + 27s^3$
8. $r^2 + 10rs + 25s^2 - 9$
9. $(x + 2y)^3 - 1$
10. $t^6 + t^4 + t^2 + 1$

bonus $x^{8n} - 16y^{4n}$

Don't judge each day by the harvest you reap, but by the seeds you plant. *Robert Louis Stevenson*