College Algebra — Joysheet 1
MAT 140, Spring 2024 — D. Ivanšić

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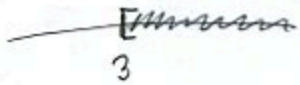
Covers: JIT 6, 7, 12, 14, 15, 17

Show all your work!

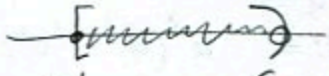
Write interval notation and sketch on the number line.

1. (3pts) $\{x|x \geq 3\}$



$[3, \infty)$

2. (3pts) $\{x| -1 \leq x < 6\}$



$[-1, 6)$

Solve the equations.

3. (3pts) $2x - 1 = 4x - 5$ $|+5$

$2x + 4 = 4x$ $|-2x$

$4 = 2x$ $|\div 2$

$x = 2$

4. (4pts) $3(2t - 3) + 1 = 2(1 - t) - 4$

$6t - 9 + 1 = 2 - 2t - 4$

$6t - 8 = -2 - 2t$ $|+2t$

$8t - 8 = -2$ $|+8$

$8t = 6$

$t = \frac{6}{8} = \frac{3}{4}$

Simplify and write in standard form:

5. (4pts) $(x + 3)^2 - 2x^2(x - 7) =$

$= x^2 + 6x + 9 - 2x^3 + 14x^2$

$= -2x^3 + 15x^2 + 6x + 9$

6. (4pts) $(x - 3)(x + 9) + 3x(x - 4) =$

$= x^2 - 3x + 9x - 27 + 3x^2 - 12x$

$= 4x^2 - 6x - 27$

Simplify and write the answer so all exponents are positive:

7. (2pts) $b^2(4b)^3 =$ $b^2 \cdot 4^3 b^3 = 64b^5$

8. (2pts) $\dfrac{(2u)^4}{u^3} =$ $\dfrac{16u^4}{u^3} = 16u^{4-3} = 16u$

9. (3pts) $a^8(a^{-2}b^4)^5 b^{-11} =$ $a^8(a^{-2})^5(b^4)^5 b^{-11} = a^8 a^{-10} b^{20} b^{-11} = a^{-2}b^9 = \dfrac{b^9}{a^2}$

10. (5pts) $(u^{-2}v^{-4})^3(4u^{-3}v^5)^2 =$ $(u^{-2})^3(v^{-4})^3 4^2 (u^{-3})^2 (v^5)^2$

$= u^{-6}v^{-12} \cdot 16 \cdot u^{-6}v^{10}$

$= u^{-12}v^{-2} \cdot 16 = \dfrac{16}{u^{12}v^2}$

11. (7pts) $\dfrac{(6x^{-5}y^3)^2}{(2x^4y^{-2})^3} =$ $\dfrac{6^2(x^{-5})^2(y^3)^2}{2^3(x^4)^3(y^{-2})^3} = \dfrac{36x^{-10}y^6}{8x^{12}y^{-6}} = \dfrac{9x^{-10-12}y^{6-(-6)}}{2}$

$= \dfrac{9x^{-22}y^{12}}{2} = \dfrac{9y^{12}}{2x^{22}}$

Factor the following.

12. (4pts) $x^2 - 5x - 14 =$ $(x-7)(x+2)$

prod $= -14$ $-7, 2$
sum $= -5$

13. (4pts) $x^2 + 14x - 32 =$ $(x+16)(x-2)$

prod $= -32$ $16, -2$
sum $= 14$

Use the *ac*-method or another method to factor. Show how you got your answer.

14. (6pts) $2x^2 - 5x - 12 =$

prod $= 2(-12) = -24$ $-8, 3$
sum $= -5$

$= 2x^2 - 8x + 3x - 12$

$= 2x(x-4) + 3(x-4)$

$= (2x+3)(x-4)$

15. (6pts) $6x^2 + 7x - 10 =$

prod $= 6(-10) = -60$ $12, -5$
sum $= 7$

$= 6x^2 + 12x - 5x - 10$

$= 6x(x+2) - 5(x+2)$

$= (6x-5)(x+2)$