

YOU MUST SHOW ALL OF YOUR WORK to receive full credit for the problem. The more work you show on your paper leading to your solution will give me more opportunity to award partial credit. Clearly indicate your solution to the problem.

1. (6 points) Give the domain and range of each relation. Determine whether the relation is or is not a function

(a) $\{(-4,4),(3,5),(2,4)\}$

Domain: $\{-4,3,2\}$

Range: $\{4,5\}$

Function or not: Yes

(b) $\{(2,5),(3,0),(2,0)\}$

Domain: $\{2,3\}$

Range: $\{0,5\}$

Function or not: No

2. (4 points) Given the function $f(x) = -3x + 4$, find

(a) $f(-1) = -3(-1) + 4 = 3 + 4 = 7$

(b) $f(0) = -3(0) + 4 = 4$

3. (4 points) Simplify. $(2x^2y^4)^3(3x^3y)^2$

$$\begin{aligned}(2x^2y^4)^3(3x^3y)^2 &= 2^3(x^2)^3(y^4)^3 3^2(x^3)^2 y^2 = 8x^{2 \cdot 3} y^{4 \cdot 3} 9x^{3 \cdot 2} y^2 = 8 \cdot 9 x^6 x^6 y^{12} y^2 \\ &= 72x^{6+6} y^{12+2} = 72x^{12} y^{14}\end{aligned}$$

4. (4 points) Simplify. $\frac{a^{-2}ba^2}{3b^2}$

$$\frac{a^{-2}ba^2}{3b^2} = \frac{a^2}{3b^2b^{-1}a^2} = \frac{1}{3b^{2+(-1)}} = \frac{1}{3b}$$

5. (4 points) Simplify. $\frac{(2x)^{-4}}{(3x)^{-2}}$

$$\frac{(2x)^{-4}}{(3x)^{-2}} = \frac{(3x)^2}{(2x)^4} = \frac{3^2x^2}{2^4x^4} = \frac{9x^{2-4}}{16} = \frac{9x^{-2}}{16} = \frac{9}{16x^2}$$

6. (4 points) Subtract the polynomials. $(12y^3 - 5y^2 + 3y - 4) - (y^3 - 3y^2 - y + 7)$

$$\begin{aligned} 12y^3 - 5y^2 + 3y - 4 - y^3 + 3y^2 + y - 7 &= 12y^3 - y^3 - 5y^2 + 3y^2 + 3y + y - 4 - 7 \\ &= 11y^3 - 2y^2 - 11 \end{aligned}$$

7. (4 points) Multiply the polynomials. $(3 - 2y)(4y^2 - y + 7)$

$$\begin{aligned} (3 - 2y)y^2 - (4y^2 - y + 7) &= (3)4y^2 + (3)(-y) + (3)7 + (-2y)4y^2 + (-2y)(-y) + (-2y)7 = \\ &= 12y^2 - 3y + 21 - 8y^3 + 2y^2 - 14y = -8y^3 + 12y^2 + 2y^2 - 3y - 14y + 21 = -8y^3 + 14y^2 - 17y \end{aligned}$$

8. (4 points) Square the binomial and simplify. $(2x - 2)^2$

$$(2x - 2)^2 = (2x)^2 - (2)(2x)(2) + 2^2 = 4x^2 - 8x + 4$$

9. (4 points) Find the product. $(4x + 3)(4x - 3)$

$$(4x + 3)(4x - 3) = (4x)^2 - (3)^2 = 4^2x^2 - 9 = 16x^2 - 9$$