

1. Simplify the expressions using rules of exponents.

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(a) $a^5 a^2$

(b) $(y^3)^6$

(c) $x^{-7} \cdot 2x^{-5}$

(d) $(3x^4 z^5)^2$

(e) $3(x^3 y^2 w^5)^3$

(f) $\frac{3x^4}{2x}$

(g) $\left(\frac{2}{x}\right)^{-4}$

(h) $\frac{x^{-3}}{x^{-4}}$

2. Add, subtract, and multiply the given polynomials.

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(a) $7x^3 - 5x + 3x + 5 - 2x^3 - 6x^2 + 3$

(b) $x^5 - 3x^4 + 11 - (6x^3 - x^2 + 6)$

(c) $(x^2 - 4)(x + 3)$

(d) $(x + 2)(x - 3)$

(e) $(2x^4 + 4x + 3)(x^2 - 7x + 1)$

(f) $(x + 2)^2(x + 3)$

3. Find both $(f \circ g)(x)$ and $(g \circ f)(x)$. Then find $(g \circ f)(1)$.

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(a) $f(x) = x - 3$ and $g(x) = 2x^2 - 3x + 4$.

- $(f \circ g)(x)$

- $(g \circ f)(x)$

- $(g \circ f)(1)$

(b) $f(x) = x^2 + 2$ and $g(x) = x + 3$.

- $(f \circ g)(x)$

- $(g \circ f)(x)$

- $(g \circ f)(1)$

4. Identify the inside and outside functions.

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(a) $2(x - 4)^2 + 5(x - 4) + 7$

- Inside:

- Outside:

(b) $(x^2 + 3)^2 + 3$

- Inside:

- Outside:

5. Find the derivatives of the given functions. *Your answer must be written as a function, not just as an expression.* /20

(a) $f(x) = x^3 - 4x + 3$

(b) $g(x) = x^4 + 3x + 3$

(c) $f(x) = x^5 - 5x + 5$

(d) $g(x) = -3x^4$

(e) $g(x) = 5x^4 + 6x + 7$

(f) $h(x) = x + 3$

(g) $h(x) = \pi^3$, where π is the number $\pi \approx 3.14159\dots$

(h) $g(x) = -5x$

(i) $h(x) = x + 3$

(j) $f(x) = -2x^7 + 3x^6 + 5x^4 - 9x^2 + 6x + 5$