

I. Simplify the following.

1. Integer exponents

- (a) $\left(\frac{3x^{-2}y^3}{2xy^{-2}}\right)^{-2}$
 (b) $\frac{(3a^4b^3)(-10ab^6)}{(-2a^3b^2)(15b^5)}$
 (c) $(2^{-2} + 4^{-3})^{-1}$
 (d) $\left(\frac{5x^{-2}y}{2xy^{-1}}\right)^{-2} \left(\frac{5xy^{-3}}{2x^{-1}y^2}\right)^3$
 (e) $\frac{x^{2n} \cdot x^2}{(x^n)^2}$
 (f) $\frac{2^{-3} + 3^{-2}}{2^{-2} - 3^{-1}}$
 (g) $\frac{[(a^2 + b^2)^3 - c]^0 a^3 b^{-4}}{(bc^5)^2 ac^{-6}}$
 (h) $\frac{(10^{1-n})^n}{(1000^n)^{n+1}} \cdot \frac{10000^{n^2+2}}{100^{3-n}}$

3. Factoring

- (a) $6u^2v^3 + 3u^3v^4 - 9u^5v^6$
 (b) $9x^2y^2 - 16w^6$
 (c) $4a^2 - 12ab + 9b^2$
 (d) $32a^2 + 12ab - 9b^2$
 (e) $b(a^2 + 2a) + b$
 (f) $8x^6 + 7x^3 - 1$
 (g) $64m^6 + 16m^3 + 1$
 (h) $a^4 + 6a^2b^4 + 25b^8$
 (i) $64x^6 - y^6$
 (j) $x^6 - 27y^3 - x^4 + 6x^2y - 9y^2$
 (k) $x - 4y - x^3 + 64y^3$
 (l) $6u^2 - 13uv + 6v^2 + 12uw - 13vw + 6w^2$
 (m) $m^9 - 3m^3 + 2$

2. Polynomials: Perform the operations

- (a) $a^2(a^3 - 2a)$
 (b) $2ab - [b^2 - (a^2 - 2ab - b^2) + 3a^2]$
 (c) $uvw(uv - 2uw + vw - 8)$
 (d) $\frac{y^3 - 6y + 5}{y^2 + 3y - 2}$
 (e) $4(x^3 + 3x^2y - 2xy^2 - y^3) - 2x(3x^2 + xy - 5y^2)$
 (f) $(a^2 - 9ab + 3b^2)(2a^2 - 3b^2 + ab)$
 (g) $(x^{2n} + 2x^n y^n + y^{2n})(x^{2n} - 2x^n y^n + y^{2n})$
 (h) $\frac{22x + 3x^4 - 11x^2 + 13x^3 - 14}{1 - 5x + x^2}$
 (i) $3a^n(a^{n+1} - 2)$
 (j) $\frac{a^5 + b^5}{a + b}$
 (k) $(a^2 - 2b)^5$
 (l) $(a^{2n} - b^{3n})^3$

4. Rational Expressions

- (a) $\frac{-36rs^6t^7}{30rs^7t^6}$
 (b) $\frac{6x^2 - xy - y^2}{2x^2 - 9xy + 4y^2}$
 (c) $\frac{\frac{a-b}{a+b} - \frac{b}{a-b}}{1 + b\left(\frac{2}{a+b} - \frac{3}{b-a}\right)}$
 (d) $\frac{2x+5}{x^2+8x+16} + \frac{3}{2x} - \frac{x-2}{x^2+4x}$
 (e) $\frac{x^2 - y^2}{xy - 2y^2} \div \frac{x^2 - 2xy - y^2}{2x^2 - 4xy}$
 (f) $\frac{b^2a^{-2} - a^2b^{-2}}{ba^{-1} + ab^{-1}}$

Examples from CAT by Castillo, et. al, CAT by Leithold, MAT3rd by Vance, ACS3rd by Kaufmann, ANT by Gillett

Also, courtesy of manjologs

compiled by mpona2010