Chapter P
Section P.5

Problem 1. Factor the following polynomials.

(a) $y^2 + 2y + 9y + 18$

$y(y+2) + 9(y+2)$

$= (y+2)(y+9)$

(b) $r^2 + 4r - 5r - 20$

$r(r+4) - 5(r+4)$

$= (r-5)(r+4)$

(c) $32 + x^2 + 8x + 4x$

$x(x+8) + 4(x+8)$

$(x+4)(x+8)$

(d) $m^2 + 2nm - 5mn - 10n^2$

$m(m+2n) - 5n(m+2n)$

$(m-5n)(m+2n)$

Problem 2. Factor the following polynomials. If the expression is already factored as much as possible, say so.

(a) $m^2 - 25$

$(m-5)(m+5)$

(b) $y^2 - 16$

$(y-4)(y+4)$

(c) $16x^2 - 40x + 25$

$16x^2 - 20x - 20x + 25$

$4x(4x-5) - 5(4x-5)$

$(4x-5)^2$

(d) $81x^4 - 900x^2$

$3^4 \quad 3^2 \cdot 5 \cdot 5 \cdot 2$

$9x^2(9x^2 - 100)$

$5^2 \quad 2^2 \quad 3^4$

(e) $100x^2 + 180x + 81$

$100x^2 + 90x + 90x + 81$

$10x(10x+9) + 9(10x+9)$

$(10x+9)^2$

(f) $50 - 98r^2$

$2(25 - 49r^2)$

$2(5-7r)(5+7r)$

(g) $16t^2 + 56t + 49$

$2^4 \quad 2^3 \cdot 7 \quad 7^2$

$16t^2 + 28t + 28t + 49$

$4t(4t+7) + 7(4t+7)$

$= (4t+7)^2$

(h) $k^4 - 16$

$(k^2-4)(k^2+4)$

$2^4 \quad 5 \cdot 2^3 \quad 5^2$

(i) $25z^2 - 36$

$(5z-6)(5z+6)$

you don't want to give them one that is already factored?

(j) $18m^3n + 3m^2n^2 - 6mn^3$

$18m^3n + 12m^2n^2 - 9m^2n^2 - 6mn^3$

$6m^2n(3m+2n) - 3mn^2(3m+2n)$

$(6m^2n - 3mn^2)(3m+2n)$

(k) $6t^2 - 11tu - 7u^2$

$6t^2 + 14tu - 3tu - 7u^2$

$2t(3t+7u) - u(3t+7u)$

$(2t-u)(3t+7u)$

(l) $40p - 32r$

$8(5p - 4r)$

(m) $36r^2 - 60rs + 25s^2$

$36r^2 - 30rs - 30rs + 25s^2$

$6r(6r-5s) - 5s(6r-5s)$

$(6r-5s)^2$

(n) $2z^2 - 7z - 4$

$2z^2 - 8z + z - 4$

$2z(z-4) + (z-4)$

$(2z+1)(z-4)$

(o) $48y^2z^3 - 28y^3z^4$

$4y^2z^3(12 - 7yz)$

(p) $225k^2 - 36r^2$

$(15k - 6r)(15k + 6r)$

(q) $k^2 - 6k - 16$

$k^2 + 8k - 2k - 16$

$k(k+8) - 2(k+8)$

$(k-2)(k+8)$

(r) $2x^2 - 2x - 40$

$2x^2 + 8x - 10x - 40$

$2x(x+4) - 10(x+4)$

$(2x-10)(x+4)$

(s) $a^4 - 9a^2 + 20$

$a^4 - 5a^2 - 4a^2 + 20$

$a^2(a^2-5) - 4(a^2-5)$

$(a^2-4)(a^2-5)$

(t) $1 - x^8$

$(1-x^4)(1+x^4)$

$[(1-x^2)(1+x^2)]^2 (1+x^4)$

$[(1-x)(1+x)]^2 (1+x^2)^2 (1+x^4)$

(u) $5x^6 - 18x^3 + 9$

$5x^6 - 15x^3 - 3x^3 + 9$

$5x^3(x^3-3) - 3(x^3-3)$

$(5x^3-3)(x^3-3)$

(v) $-15r^2 + 2r + 24$

$-15r^2 + 20r - 18r + 24$

$5r(-3r+4) + 6(-3r+4)$

$(5r+6)(-3r+4)$