The Weekly Rigor

No. 194 "A mathematician is a machine for turning coffee into theorems." March 10, 2018

18 Problems in Factoring by Grouping

PROBLEMS

For each of the following expressions, factor by the "grouping" method.

1. $x^3 - 2x^2 + 5x - 10$

2. $x^3 - 3x^2 + 4x - 12$

3. $x^3 - x^2 + 2x - 2$

4. $x^3 + 6x^2 - 2x - 12$

5. $3x^3 - 2x^2 - 6x + 4$

6. $x^3 - x^2 - 5x + 5$

7. $5mn + 25m + 3n^3 + 15n^2$

8. $4au + 24av - 5bu - 30bv$

9. $15xw + 18xk + 25yw + 30yk$

10. $7xy + 28x^3 + y + 4x^2$

11. $6b^3 + 16b^2 - 15b - 40$

12. $12r^3 + 20r^2 + 15r + 25$

13. $4b^3 + b^2 + 8b + 2$

14. $28k^3 - 4k^2 - 35k + 5$

15. $7xy - 3n - x + 21ny$

16. $42ab - 25b - 35a + 30b^2$

17. $21uv + 8b + 3u + 56bv$

18. $28xy - 7k - 49x + 4ky$

ANSWERS

1. $(x-2)(x^2+5)$	2. $(x-3)(x^2+4)$
3. $(x-1)(x^2+2)$	4. $(x+6)(x^2-2)$
5. $(3x-2)(x^2-2)$	6. $(x-1)(x^2-5)$
7. $(5m+3n^2)(n+5)$	8. $(4a-5b)(u+6v)$
9. $(3x+5y)(5w+6k)$	10. $(7x+1)(y+4x^2)$
11. $(2b^2-5)(3b+8)$	12. $(4r^2+5)(3r+5)$
13. $(b^2+2)(4b+1)$	14. $(4k^2-5)(7k-1)$
15. $(x+3n)(7y-1)$	16. $(7a+5b)(6b-5)$
17. $(3u+8b)(7v+1)$	18. $(7x+k)(4y-7)$

SELECTED SOLUTIONS

1. $x^3-2x^2+5x-10=x^2(x-2)+5(x-2)=(x-2)(x^2+5)$.

3. $x^3-x^2+2x-2=x^2(x-1)+2(x-1)=(x-1)(x^2+2)$.

5. $3x^3-2x^2-6x+4=x^2(3x-2)-2(3x-2)=(3x-2)(x^2-2)$.

7. $5mn+25m+3n^3+15n^2=5m(n+5)+3n^2(n+5)=(5m+3n^2)(n+5)$.

9. $15xw+18xk+25yw+30yk=3x(5w+6k)+5y(5w+6k)=(3x+5y)(5w+6k)$.

11. $6b^3+16b^2-15b-40=2b^2(3b+8)-5(8b+8)=(2b^2-5)(3b+8)$.

13. $4b^3+b^2+8b+2=b^2(4b+1)+2(4b+1)=(b^2+2)(4b+1)$.

15. $7xy-3n-x+21ny=7xy-x+21ny-3n=x(7y-1)+3n(7y-1)=$
$=(x+3n)(7y-1)$.

17. $21uv+8b+3u+56bv=21uv+3u+56bv+8b=3u(7v+1)+8b(7v+1)=$
$=(3u+8b)(7v+1)$.