ILLAWARRA TUTORING

In this worksheet you will expand your skills to solve systems that include at least one non-linear equation. Each question requires you to methodically use substitution, factorisation or other algebraic techniques to find the solution(s) of the system.

Easy Questions

1. Solve the system $y = x^2$ and $y = 4$.
2. Solve the system $x + y = 3$ and $y = x^2$.
3. Solve the system $y = 2x^2$ and $y = x + 1$.
4. Solve the system $y = x^2 - 4$ and $x = 2$.
5. Solve the system $y^2 = x$ and $y = 3$.

Intermediate Questions

6. Solve the system $y = x^2 + 1$ and $x + y = 5$.
7. Solve the system $y^2 = x + 2$ and $y = x - 2$.
8. Solve the system $\sqrt{x} + y = 5$ and $y = x - 1$. (Remember, $x \geq 0$.)
9. Solve the system $y = x^2$ and $y^2 = x$.
10. Solve the system $y = x^2$ and $y = 3 - x$.
11. Solve the system $y = x^2 - 3$ and $y = -x^2 + 5$.
12. Solve the system $y^2 = 4x$ and $y = x - 2$.
13. Solve the system $x^2 + y^2 = 25$ and $y = x + 1$.
14. Solve the system $y = (x - 1)^2$ and $y = 2x + 3$.
15. Solve the system $xy = 6$ and $y = x + 2$.
16. Solve the system $x^2y = 8$ and $y = 2x$.
17. Solve the system $y = \dfrac{1}{x}$ and $y = x - 1$.
18. Solve the system $y = 2x^2 - 3$ and $x = y - 1$.

19. Solve the system $y = x^2$ and $y = \frac{1}{2}x + 2$.

20. Solve the system $y = x^2 + 3x + 2$ and $y = -x$.

Hard Questions

21. Solve the system $x^2 + y^2 = 10$ and $y = x^2 - 4$. (Hint: Substitute for y in the circle equation and solve the resultant quartic.)

22. Solve the system $y^2 = 2x + 3$ and $x^2 + y = 4$. (Hint: Express y from the second equation and substitute into the first.)

23. Solve the system $\sqrt{x+3} + y = 5$ and $y = x - 1$. (Remember to consider the domains of the square root.)

24. Solve the system $y = x^2 - 1$ and $y^3 = 8x$. (Hint: Substitute for y from the first equation into the cubic.)

25. Solve the system $xy = 4$ and $x^2 + y^2 = 10$. (Hint: Use the identity $(x + y)^2 = x^2 + y^2 + 2xy$.)

26. Solve the system $y = \frac{4}{x}$ and $y^2 = x + 4$. (Hint: Substitute the expression for y into the second equation and solve for x.)

27. Solve the system $y = \frac{1}{x+1}$ and $x + y = 2$. (Hint: Substitute and clear denominators carefully.)

28. Solve the system $(x - y)^2 = 2x + 3y + 1$ and $x^2 + y^2 = 25$. (This requires careful expansion and substitution.)

29. Solve the system $\sqrt{x} + \sqrt{y} = 5$ and $x + y = 21$. (Hint: Let $a = \sqrt{x}$ and $b = \sqrt{y}$, and use the given conditions.)

30. Solve the system $y = x^3 - x$ and $y = 2x + 1$. (Hint: Equate the expressions for y and solve the resulting cubic equation.)