General expressions

1. Is it a **standard result**?
Does it need scaling?

2. Can I **manipulate** it to make it a **standard result**?
Think trig identities or expanding brackets

3. Can I use the **reverse chain rule**?
Is the numerator the derivative of the denominator?
Is one factor related to the derivative of the other?

Fractional expressions

4a. Can I **split the numerator**?
Is there a single term in the denominator?
4b. Can I do **partial fractions**?
Does the denominator factorise?
4c. Can I do **algebraic division**?
Is the fraction improper?

Product expressions

4. Use **integration by parts**
For u, choose the ln term,
then the polynomial

5. Last resort: **substitution**

Integrate the following expressions with respect to x

1. $\sec^2 x$

2. $(3x+2)^5$

3. $x\sqrt{1+x^2}$

4. $\dfrac{4\sin x \cos x}{4-8\sin^2 x}$

5. $2x \sin(3x-1)$

6. $\dfrac{x-1}{\sqrt{x}}$

7. $\sin x\, e^{\cos x}$

8. $\dfrac{x+1}{x-1}$

9. $x\sqrt{x^2+1}$

10. $\dfrac{3x+2}{(x+1)(x-2)}$

11. $\dfrac{x+1}{x}$

12. $\ln x$

13. $\frac{1}{x}\sqrt{\ln x}$

14. $\frac{1}{1+e^x}$

15. $x\sec^2 x$

16. $\frac{2x}{2x^2-3}$

17. $\frac{2x}{(x^2-3)^2}$

18. $x^2 e^{3x}$

19. $\sin x \cos^3 x$

20. $\tan^2 x$

21. $\frac{x^2}{x+1}$

22. $\frac{x}{\sqrt{x+1}}$

23. $\frac{2x-1}{x^2+3x+2}$

24. $\sin^2 x$