TECHNIQUES OF INTEGRATION

0. Just do it
   For when you just know the answer
   - Know your derivatives
   - Divide by constant derivative

1. Rewrite it
   For when a little work would make it easier
   - Expand brackets
   - Simplify
   - Use a trig identity
   - Make your own trig identity

2. Substitution
   For when it might be easier if one thing was replaced by something else
   - Find the most annoying bit
   - Look for a derivative
   - Work the substitution
   - May need to rewrite

3. By parts
   For products of two functions
   - Integrate what you can
   - Aim to make it simpler
   - May need it more than once
   - Try "1 times ..."
   - Go round in circles

4. Reduction formula
   For big powers that will take lots of by parts
   Making them:
   - Watch for the original
   - Will have to rewrite or go round in circles
   Using them:
   - Start from the bottom
   - Try a definite integral formula

5. Trig substitution
   For powers and roots of pythagoras-ish expressions
   - Use trig identity to decide which one
   - Work the substitution to put it in
   - Work the substitution to get x back

6. Partial fractions
   For rewriting polynomials over polynomials
   - Polynomial division
   - Splitting denominator
   - Completing the square

7. Do it numerically
   For when it’s too hard to do it algebraically
   - One-point rules: left, right, midpoint
   - Trapezoidal rule
   - Simpson’s rule