# CE - Further calculus

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| **Derive the volumes of revolution formula** |  |
| **When is an improper integral?** |  |
| **How can you evaluate an improper integral? What outcomes can you have?** | 1. By replacing the limit with a variable and taking the limit of that variable. 2. You can have convergent (if the limit exists) or divergent (if the limit does not exist) integral.     **Examples:** |
| **What 2 limit results do you need to know for the integration topic?** | Where k > 0. |
| **What is the formulae for ‘Volumes of Revolution’?** | For rotation around the x-axis.    For rotation around the y-axis.  *This is because, when you have a small change in x then the radius of the cylinders are y and following πr2 you get the top formula with limits a b (both x-values with b - a representing the total height). Whereas, rotating around the y-axis means a small change in y with a radius x. This gives you the bottom formula with limits a b (both y-values).* |
| **How can you calculate the mean value of a function?** |  |
| **What substitutions do you need to know for what what integrals?** | For integrals involving … try the substitution ...         **Examples:**    Would involve using x = sin(u).  And so would the one below:    Yet, this particular integral can also be done by parts: |
| **What are the derivatives of sinh and cosh?** |  |
| **How should you differentiate inverse trigonometric and hyperbolic functions?** | 1. Let y = (inverse function). 2. Take the function of both sides. 3. Use the chain rule. 4. Use an identity. 5. Substitute either x or y back in. |
| **How can you split nonlinear partial fractions?** | *An example is below…* |
| **What is a reduction formula and how can you find it?** | A reduction formula for In is an equation that relates In to In - 1 and/or In - 2 which is used to reduce an integral. |