

Assignment 1

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Upload date: 9th August 2014

Due date: 28 the August 2014

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- This is a **mandatory** assignment.
 - Write legibly on a a4 paper.
 - Write your name, section and roll (id) number.
 - Do not email me **soft copy** of the assignment. It should be handwritten.
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1. If $y = a \cosh(\log x^m) + b \sinh(\log x^m)$, prove that
 $x^2 y_{n+2} + (2n + 1)xy_{n+1} + (n^2 + m^2)y_n = 0$
2. Find the angle between the radius vector and the tangent for the curve
 $r^2 = a^2(\cos 2\theta + \sin 2\theta)$
3. Obtain the pedal equation for the curve $r = a \operatorname{sech}(n\theta)$
4. Find the radius of curvature for the curve $xy^3 = a^4$ at (a, a)
5. Trace the curve $r = a\theta$ (the spiral of archimedes)
Prove that curvature of a polar curve is

$$K = \frac{|r^2 + 2r_1^2 - rr_2|}{(r^2 + r_1^2)^{3/2}}$$

where $r_1 = \frac{dr}{d\theta}$ and $r_2 = \frac{d^2r}{d\theta^2}$
