Evaluate the following integrals if possible:

1. $\int_1^\infty \frac{dx}{x^3}$
2. $\int_1^4 \frac{dx}{(x-3)^3}$
3. $\int_0^4 \frac{dx}{\sqrt{x}}$
4. $\int_0^2 x\log(x)dx$

Find the arc length

1. $y = \log(\cos(x)), 0 \leq x \leq \frac{\pi}{3}$
2. $y = 1 + 2\sqrt{x^3}, 0 \leq x \leq 1$

1. Find the arc lenght of $x = t + 1, y = t^{\frac{3}{2}} - 1$ for $1 \leq t \leq 2$
2. Find the slope of the line tangent to $x = \cos(\theta), y = \sin(2\theta)$ at $\theta = \frac{\pi}{6}$
3. Graph $x(t) = t - 1, y(t) = t^2 + 1$ by eliminating the parameter
4. For which t is $x = t^2 + 1, y = t^2 + t$ concave up?
5. Graph $r = 2$
6. Graph $\theta = 3$
7. Graph $r = 1 - \sin(\theta)$
8. Find the slope of the line tangent to $r = 1 - \sin(\theta)$ at $\theta = \frac{\pi}{3}$
9. Write the equation for the ellipse with foci (0 ± 5) and vertices $(0, \pm 13)$
10. Identify the conic and write in standard form $x^2 = 2y^2 + 4y$
11. Identify the conic given by $r = \dfrac{3}{1 - 2\cos(\theta)}$
12. Write $r = \dfrac{3}{1 - 2\cos(\theta)}$ in standard form.
13. Define $\log(x)$
14. Define $2^{\sin(x)}$
15. Define $\left(1 - \frac{2}{x}\right)^x$
16. Compute $\lim_{x\to\infty} \left(1 - \frac{2}{x}\right)^x$