5. Evaluate

$$\int \frac{1}{x^3}\sqrt{\frac{x^2-1}{x^2}}\,dx.$$

$$\int \frac{1}{x^3} \sqrt{\frac{x^2-1}{x^2}}\, dx$$

$$= \int \sqrt{1-\frac{1}{x^2}}\ \frac{1}{2}\, d\left(1-\frac{1}{x^2}\right)$$

$$= \frac{1}{2}\cdot\frac{2}{3}\left(1-\frac{1}{x^2}\right)^{\frac{3}{2}} = \frac{1}{3}\left(1-\frac{1}{x^2}\right)^{\frac{3}{2}}$$

6. Evaluate

$$\int_{-1}^{1} (x^2 - 2x + 1)dx.$$

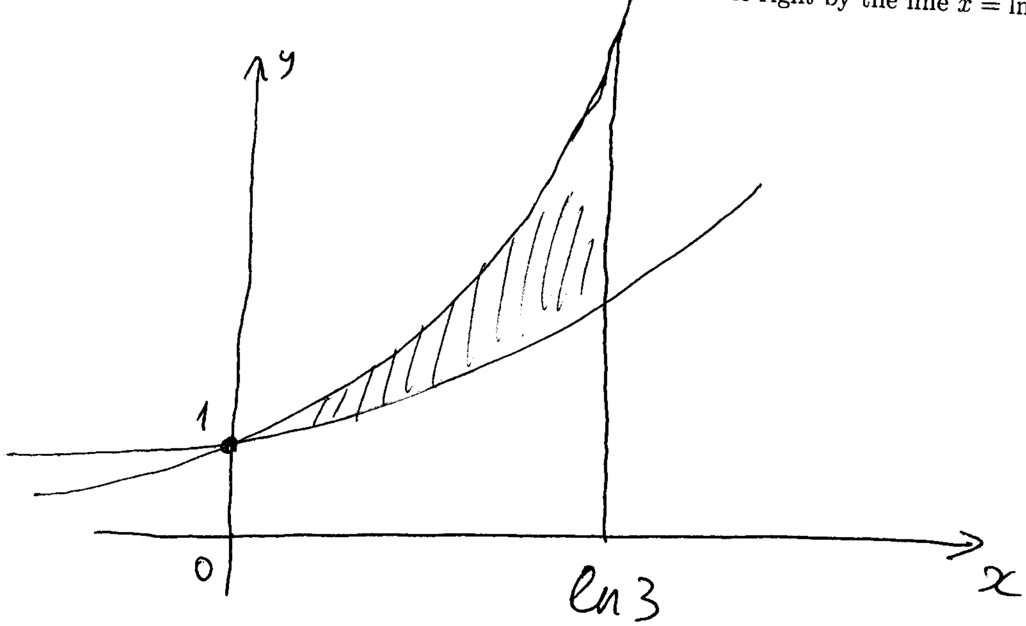
$$\int_{-1}^{1} (x^2 - 2x + 1)\, dx$$

$$= \frac{x^3}{3} - x^2 + x \Big|_{-1}^{1}$$

$$= \left(\frac{1}{3} - 1 + 1\right) - \left(-\frac{1}{3} - 1 - 1\right)$$

$$= \frac{2}{3} + 2 = \frac{8}{3}$$

8. Find the area of the "triangular" region in the first quadrant that is bounded above by the curve $y = e^{2x}$, below by the curve $y = e^x$, and on the right by the line $x = \ln 3$.



$$\text{Area} = \int_0^{\ln 3} (e^{2x} - e^x)\, dx$$

$$= \left(\frac{e^{2x}}{2} - e^x\right)\Big|_0^{\ln 3}$$

$$= \left(\frac{9}{2} - 3\right) - \left(\frac{1}{2} - 1\right) = 4 - 2 = 2$$