

Integration by parts : Applications

$$\int_a^b u \cdot v' dx = [uv]_a^b - \int_a^b u' \cdot v dx$$

1. Calculate the following Integral using the I.B.P. Formula : $F(x) = \int_0^x \frac{t^3}{\sqrt{1+t^2}} dt$

2. Calculate the following Integral using the I.B.P. Formula : $F(x) = \int_2^x \ln \frac{t-1}{t+1} dt \quad (x > 1)$

3. Calculate $\lim_{x \rightarrow 1} F(x)$

4. Show that for $(x > 1)$, $F(x) \leq -\ln(x^2 - 1) + 3\ln 3$, and find $\lim_{x \rightarrow +\infty} F(x)$