Gavin McRoy

1. $\int_1^{\infty} xe^{-x^2}\,dx$

$u=-x^2 \quad du=-2x\,dx$

$-\frac{1}{2}\,du = x\,dx$

$-\frac{1}{2}\int_1^{\infty} e^u\,du = \lim_{c\to\infty} -\frac{1}{2}\int_1^{c} e^u\,du$

$= \lim_{c\to\infty} -\frac{1}{2}e^{-x^2}\Big|_1^{c} \quad \cancel{-\frac{1}{2}e^{-c^2}}^{\,0} - \left(-\frac{1}{2}e^{-1}\right)$

$= \boxed{+\frac{1}{2e} \quad \text{• Converges}}$

2. On the PDF I cant see if its X-2 or X+2 I'm going to assume its X-2

$\left(= \lim_{c\to 2^-}\int_1^{c} \frac{1}{(x-2)^{1/3}}\,dx + \lim_{b\to 2^+}\int_b^{5} \frac{1}{(x-2)^{1/3}}\,dx\right)$

~~A. $(1)^2\left(\frac{1}{2}\right)^1$, $(1)^3\left(\frac{1}{2}\right)^2$, $(1)^4\left(\frac{1}{2}\right)^3$, $(1)^5\left(\frac{1}{2}\right)^4$~~

~~$\left\{\frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}\right\}$~~

~~B. Appears to be converging towards 0~~

~~C. $(1)^{k+1}$~~

~~$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16}$~~

~~$\frac{8}{16} + \frac{4}{16} + \frac{2}{16} + \frac{1}{16}$~~

Gavin McKay

3. $(-1)^{k+1}\left(\frac{1}{2}\right)^k$ $\qquad$ $(-1)^3\left(\frac{1}{2}\right)^2$

A. $(-1)^{1+1}\left(\frac{1}{2}\right)^1$

$= \left\{+\frac{1}{2}, -\frac{1}{4}, \frac{1}{8}, -\frac{1}{16}\right\}$

B. Appears to be converging towards zero $|r| < 1$

C. $\frac{1}{2}, \left(\frac{2}{4} - \frac{1}{4}\right), \left(\frac{2}{8} + \frac{1}{8}\right), \left(\frac{3}{8} - \frac{1}{16}\right)$

$\left(\frac{1}{2}, \frac{1}{4}, \frac{3}{8}, \frac{5}{16}\right)$

ILATE

4. A $\int x\sec^2 x \, dx$ • Integration by parts

$$\left( \begin{array}{ll} u = x & du = dx \\ dv = \sec^2 x \, dx & v = \tan x \end{array} \right)$$

B. $\int \frac{3x^2+2}{x^3+2x} dx$ • Partial Fraction Decomposition

$$= \int \frac{(3x^2+2)}{x(x^2+2)} dx = \left( \frac{A}{x} + \frac{Bx+C}{x^2+2} \right)$$

C. I can't see if its plus $\sqrt{16+x^2}$ or $\sqrt{16-x^2}$ ? It doesn't show up • Trig Substitution

- If its $\sqrt{16-x^2}$

$x = 4\sin\theta \quad dx = 4\cos\theta \, d\theta$

$$\left( = \int \frac{\sqrt{16-(4\sin\theta)^2} \cdot 4\cos\theta \, d\theta}{(4\sin\theta)^2} \right)$$

if its $\sqrt{16+x^2}$ $\quad x = 4\tan\theta \quad dx = 4\sec^2\theta \, d\theta$

$$\left( = \int \frac{\sqrt{16-(4\tan\theta)^2} \cdot 4\sec^2\theta \, d\theta}{(4\tan\theta)^2} \right)$$