Further Integration

Pure: Calculus · 6 questions · step-by-step answers at the end

Name: Date: Score: / 6

USEFUL EQUATIONS

$\int e^{kx}\,dx = e^{kx}/k + c \quad \int \cos kx\,dx = (1/k)\sin kx + c,\ \int \sin kx\,dx = -(1/k)\cos kx + c$

$\int f'(x)/f(x)\,dx = \ln|f(x)| + c \quad \int u\,dv = uv - \int v\,du$

Questions

Show your working in the space under each question.

1. EASY Find $\int 1/(2x+1)\,dx$.

2. EASY Evaluate $\int_0^{\pi/2} \sin 2x\,dx$.

3. MEDIUM Find $\int 2x/(x^2+1)\,dx$.

4. MEDIUM Find $\int \sin^2 x\,dx$.

5. HARD Find $\int (x + 7)/[(x - 1)(x + 3)]\, dx$.

6. HARD Find $\int xe^{3x}\, dx$.

Step-by-step answers

Further Integration

1. **$\frac{1}{2}\ln|2x + 1| + c$**.
2. $[-\frac{1}{2}\cos 2x]$ from 0 to $\pi/2 = 1/2 + 1/2 =$ **1**.
3. The top is the derivative of the bottom: **$\ln(x^2 + 1) + c$**.
4. $\sin^2 x = (1 - \cos 2x)/2$, so the integral is **$x/2 - (\sin 2x)/4 + c$**.
5. Partial fractions: $2/(x - 1) - 1/(x + 3)$. Integral: **$2\ln|x - 1| - \ln|x + 3| + c$**.
6. $u = x$, $dv = e^{3x}\,dx$, $v = e^{3x}/3$. **$xe^{3x}/3 - e^{3x}/9 + c$**.