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Integrate

1 $\int x^3(2x^4+5)^3\,dx$ $u = 2x^4+5$

$du = 8x^3\,dx$

$\frac{1}{8}du = x^3\,dx$

$\frac{1}{8}\int u^3 \cdot du$

$\boxed{\frac{1}{32}(2x^4+5)^4 + C}$

2 $\int \frac{5}{x^5}\,dx$ $\int 5x^{-5}$

$\boxed{-\frac{5}{4}x^{-4} + C}$

3 $\int \frac{x}{\sqrt{9-x^2}}\,dx$ $u = 9-x^2$

$du = -2x$

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

$-\frac{1}{2}\int \frac{1}{u^{1/2}} \cdot du$

$-\frac{1}{2}\int u^{-1/2}\,du$ $\boxed{-(9-x^2)^{1/2} + C}$

4 $\int \frac{(\ln x)^3}{x}\,dx$ $u = \ln x$

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

$\int u^3 \cdot du$ $\boxed{\frac{1}{4}(\ln x)^4 + C}$

5 $\int \frac{x^4 - 3x^3 + 2}{x}\,dx$ $x^{-1}(x^4 - 3x^3 + 2) = x^3 - 3x^2 + 2x^{-1}$

$\boxed{\frac{1}{4}x^4 - x^3 + \ln x^2 + C}$

6. $\int \sqrt{x^5}\,dx$ $\int x^{5/2}$

$\boxed{\frac{2}{7}x^{7/2} + C}$

7 $\int_0^2 x(x^2+1)^3\,dx$ $u = x^2+1$

$du = 2x\,dx$

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

$\frac{1}{2}\int_0^2 u^3$

$\frac{1}{8}(x^2+1)^4 \Big|_0^2$

$\frac{5^4}{8} - \frac{1}{8} = \boxed{78}$

8. $\int_0^{\frac{\pi}{8}} (\sin^5 2x)(\cos 2x)\,dx$ $u = \sin 2x$

$du = 2\cos 2x$

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

$\frac{1}{2}\int u^5\,du$

$\frac{1}{12}(\sin 2x)^6 \Big|_0^{\pi/8}$

$\frac{\left(\frac{\sqrt{2}}{2}\right)^6}{12} = \boxed{\frac{1}{96}}$

Express each definite integral in terms of *u*, but do not evaluate.

1) $\displaystyle\int_{-1}^{0} \frac{8x}{(4x^2+1)^2}\,dx;\ u = 4x^2+1$

$\displaystyle\int_{5}^{1} \frac{1}{u^2}\,du$

2) $\displaystyle\int_{0}^{1} -12x^2(4x^3-1)^3\,dx;\ u = 4x^3-1$

$\displaystyle\int_{-1}^{3} -u^3\,du$

3) $\displaystyle\int_{-1}^{2} 6x(x^2-1)^2\,dx;\ u = x^2-1$

$\displaystyle\int_{0}^{3} 3u^2\,du$

4) $\displaystyle\int_{0}^{1} \frac{24x}{(4x^2+4)^2}\,dx;\ u = 4x^2+4$

$\displaystyle\int_{4}^{8} \frac{3}{u^2}\,du$