

Integration - Review of Various Techniques

Evaluate the following

<p>① Find $\frac{d}{dx} \int_5^{3x} (t^2 - t) dt$</p> $27x^2 - 9x$	<p>2. $\int xe^{2x} dx$</p> $\frac{1}{2}xe^{2x} - \frac{1}{4}e^{2x} + C$	<p>3. $\int \frac{1}{x^3 + x^2 - 2x} dx$</p> $-\frac{1}{2} \ln x + \frac{1}{6} \ln x+2 + \frac{1}{3} \ln x-1 + C$
<p>4. $\int \frac{e^x + e^{-x}}{e^x - e^{-x}} dx$</p> $\ln e^x - e^{-x} + C$	<p>⑤. $\int_{-4}^4 x dx$</p> 16	<p>6. $\int \sec x (\sec x + \tan x) dx$</p> $\tan x + \sec x + C$
<p>7. $\int \frac{dx}{(x-1)^2}$</p> $-\frac{1}{x-1} + C$	<p>8. $\int \frac{dx}{x(1+\ln^2 x)}$</p> $\tan^{-1}(\ln x) + C$	<p>9. $\int \frac{e^{3x} dx}{1+e^{6x}}$</p> $\frac{1}{3} \tan^{-1}(e^{3x}) + C$
<p>10. $\int \frac{dx}{\sqrt{9-4x^2}}$</p> $\frac{1}{2} \sin^{-1}\left(\frac{2}{3}x\right) + C$	<p>11. $\int \frac{\sin 2x}{(1-\cos 2x)^{5/2}} dx$</p> $-\frac{1}{4} (1-\cos 2x)^{-2} + C$	<p>12. $\int_{-\infty}^0 e^x dx$</p> 1 (converges)
<p>13. $\int_{-1}^+ \frac{dx}{1-x}$</p> <p>diverges</p>	<p>14. $\int_{-\infty}^{\infty} x^3 dx$</p> <p>diverges</p>	<p>15. $\int 7^{\sin x} \cos x dx$</p> $\frac{1}{\ln 7} \cdot 7^{\sin x} + C$
<p>16. $\int \frac{\cos^3 x + 4}{\cos^2 x} dx$</p> $\sin x + 4 \tan x + C$	<p>17. $\int \ln^2 x dx$</p> $x(\ln x)^2 - 2x \ln x + 2x + C$	<p>18. $\int \frac{x+4}{(x-1)(x+6)} dx$</p> $\frac{5}{7} \ln x-1 + \frac{2}{7} \ln x+6 + C$
<p>19. $\int \frac{\sec^2 x}{\tan x} dx$</p> $\ln \tan x + C$	<p>20. $\int x^3 (2+x) dx$</p> $\frac{3}{2}x^{4/3} + \frac{3}{7}x^{7/3} + C$	<p>21. $\int x^2 \cos x dx$</p> $x^2 \sin x + 2x \cos x - 2 \sin x + C$