INTEGRATION BY SUBSTITUTION - CHAPTER REVIEW

1 Evaluate: **(a)** $\int_{-\frac{1}{2}}^{\frac{1}{2}} \frac{1}{\sqrt{1-x^2}}\,dx$ **(b)** $\int_0^{\frac{1}{2}} \frac{1}{1+4x^2}\,dx$ **(c)** $\int_{-\frac{1}{2}}^{\frac{1}{2}} \frac{x}{\sqrt{1-x^2}}\,dx$ **(d)** $\int_0^{\sqrt{3}} \frac{x}{\sqrt{1+x^2}}\,dx$

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2 Find: (a) $\int \frac{dx}{(1-x^2)^{\frac{3}{2}}}$ (b) $\int \frac{x^3+1}{x^2+1}dx$ (c) $\int \frac{x^3}{x^2+2x+1}dx$

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3 Evaluate: **(a)** $\int_0^2 \frac{x}{(x^2+2)^2}\,dx$ **(b)** $\int_0^{\frac{\pi}{2}} \frac{\cos x}{1+\sin x}\,dx$ **(c)** $\int_0^1 \frac{e^x}{1+2e^x}\,dx$

3 Evaluate: **(d)** $\int_{\frac{\pi}{8}}^{\frac{\pi}{4}} \sin^2 x \cos^2 x \, dx$ **(e)** $\int_{\frac{3}{2}}^{4} \sqrt{2x+1} \, dx$

6 Find:

(a) $\int \frac{1-4x^2}{x} dx$ **(b)** $\int (\sin x + \cos x)^2 \, dx$ **(c)** $\int \sin^2 x \cos x \, dx$ **(d)** $\int \sin x \sec^2 x \, dx$

(e) $\int \frac{\sin^2 x}{\cos^2 x} dx$ (f) $\int \sin^2 x \cos^2 x \, dx$ (g) $\int \cos^2 x \, dx$ (h) $\int \cos^4 x \, dx$

9 Find: (a) $\int \frac{\cos 2\theta}{\sin^2 2\theta}\,d\theta$ (b) $\int x e^{-x^2}\,dx$ (c) $\int \frac{2x}{x^2+1}\,dx$

9 Find: **(d)** $\int x\cos(x^2)\,dx$ **(e)** $\int \sec^2 x \tan^2 x\,dx$

12 **(a)** Sketch the graph of the curve with equation: $y = \dfrac{x(3-x)}{x-1}$.

(b) Calculate the area of the region enclosed by the curve and the straight lines $x + 3 = 0$, $x = 0$ and $y = 2 - x$.

17 **(a)** Use the substitution $t = \tan\frac{x}{2}$ to evaluate $\int_0^{\frac{\pi}{2}} \frac{dx}{1+\sin x}$.

(b) Hence find the value of $\int_0^{\frac{\pi}{2}} \frac{\sin x}{1+\sin x}\,dx$.