Homework #1 - Substitution Review

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19. $\int \frac{a+bx^2}{\sqrt{3ax+bx^2}}$

???

20. $\int \frac{z^2}{z^3+1}dz$

$u = z^3 \quad \frac{1}{3}du = z^2dz \qquad \int \frac{1}{3}\frac{du}{u+1} = \frac{1}{3}\int \frac{1}{u+1}du = \frac{\ln(u+1)}{3} = \boxed{\frac{\ln(z^3+1)}{3} + C}$

24. $\int \sqrt{x}\sin(1+x^{\frac{3}{2}})dx$u

???

26. $\int \frac{dx}{ax+b} \quad (a \neq 0)$

$u = ax+b \quad \frac{du}{dx} = a \quad dx = \frac{du}{a} \qquad \int \frac{du}{a} * \frac{1}{u} = \int \frac{1}{a} * \frac{1}{u}du = \frac{1}{a}\int * \frac{1}{u}du = \boxed{\frac{\ln(ax+b)}{a} + C}$

27. $\int (x^2+1)(x^3+3x)^4dx$

$u = x^3+3x \quad du = 3x^2+3 \qquad \int u^4du = 4u^3 = \boxed{4\left(x^3+3x\right)^3 + C}$

39. $\int \frac{\sin 2x}{1+\cos x^2}dx$

???

41. $\int \cot x dx$

$\int \frac{\cos x}{\sin x}dx \qquad u = \sin x \quad du = \cos x dx \qquad \int \frac{1}{u}du = \ln u + C = \boxed{\ln \sin x + C}$

53. $\int_0^1 \cos \frac{\pi t}{2}dt$
60. $\int_0^1 xe^{-x^2}dx$
65. $\int_0^a x\sqrt{x^2+a^2}dx \quad (a > 0)$