Математический анализ

1 Неопределённые интегралы

1.
$$\int \frac{2}{x+3}dx = 2\ln|x+3| + C.$$

2.
$$\int \frac{x^3-5x+8}{x^2-2x+4}dx = \int \left(x + \frac{2x^2-9x+8}{x^2-2x+4}\right)dx = \int \left(x+2-\frac{5x}{x^2-2x+4}\right)dx =$$
$$= \frac{x^2}{2}+2x-\int \frac{5x}{x^2-2x+4}dx = (u=x-1) = \frac{x^2}{2}+2x-\int \frac{5u+5}{u^2+3}du =$$
$$= \frac{x^2}{2}+2x-\int \frac{5d(u^2+3)}{2(u^2+3)} - 5\int \frac{1}{u^2+3}du + C =$$
$$= \frac{x^2}{2}+2x+\frac{5}{2}\ln\left(u^2+3\right) - \frac{5}{\sqrt{3}}\arctan\frac{u}{\sqrt{3}} + C =$$
$$= .\frac{x^2}{2}+2x+\frac{5}{2}\ln\left(x^2-2x+4\right) - \frac{5}{\sqrt{3}}\arctan\frac{x-1}{\sqrt{3}} + C.$$

3. Имеем
$$\int \frac{\sin 3x}{(1-2\cos 3x)^2}dx = \int \frac{d\cos 3x}{-3(1-2\cos 3x)^2}dx = (u=\cos 3x) = \int \frac{du}{-3(1-2u)^2} =$$
$$= \int \frac{d(1-2u)}{6(1-2u)^2} = (v=1-2u) = \int \frac{dv}{6v^2} = -\frac{1}{6v}+C = -\frac{1}{6(1-2u)}+C =$$
$$= -\frac{1}{6(1-2\cos 3x)} + C.$$