Techniques of integration

1. Change of variables-integration by parts

(1) $\int (x+6)^2 e^{-2x} dx$,
(2) $\int \frac{dx}{\sqrt{3x^2-4}}$,
(3) $\int \frac{dx}{3x^2\sqrt{3-2x^2}}$,
(4) $\int x^3 e^{x^2} dx$,
(5) $\int (x-3)\ln(x+2)dx$,
(6) $\int \sec(x^2+1)xdx$,
(7) $\int_0^{\frac{\pi}{2}} \sin^3 x dx$,
(8) $\int_0^{\pi} \sin^4(\frac{x}{2})dx$,
(9) $\int u^n e^u du$.

2. Rational functions-trigonometric functions

(1) $\int \frac{e^x}{1-e^{2x}}dx$. (Extra problem: Why is $\int_{-1}^{0} \frac{e^x}{1-e^{2x}}dx = \infty$?)
(2) $\int \frac{x^2}{x^2-4}dx$,
(3) $\int \frac{x}{x^2-4}dx$,
(4) $\int \frac{x^3}{x^2-4}dx$,
(5) $\int \frac{1}{\sin u}du$,
(6) $\int \frac{1}{\sin^2 u}du$,
(7) $\int \frac{1}{\sin^{2n} u}du$
(8) $\int \frac{1}{u^2\sqrt{1-u^2}}du$,
(9) $\int (1-u^2)^{3/2}du$,
(10) * Solve $\int \frac{1}{\sqrt{1+x^2}}dx$ with the change of variables $x = \tan u$ and $x = \sinh v$. What do you get? Is the answer contained in the back of your book?