

Integration Exercises - Part 3 (Hyperbolic Functions)

(2 pages; 7/7/26)

$$(1) \int \operatorname{cosech}^2 x \, dx$$

$$(2) \int \tanh x \, dx \text{ (from 1st principles)}$$

$$(3) \int \operatorname{sech} x \tanh x \, dx$$

$$(4) \int \tanh^2 x \, dx$$

$$(5) \int \operatorname{sech}^2 x \tanh^2 x \, dx$$

$$(6) \int \operatorname{sech}^3 x \tanh x \, dx$$

$$(7) \int \cosh^2 x \, dx$$

$$(8) \int \cosh^3 x \, dx$$

$$(9) \int \operatorname{sech} x \, dx$$

$$(10) \int \frac{1}{\sqrt{4x^2-9}} \, dx$$

$$(11) \text{ (a) } \int \cosh^{-1} x \, dx \text{ (b) } \int \sinh^{-1} x \, dx \text{ (c) } \int \tanh^{-1} x \, dx$$

$$(12) \int \frac{1}{(x^2-9)^{\frac{3}{2}}} \, dx$$

$$(13) \int \sqrt{4+x^2} \, dx$$

$$(14) \int \sqrt{\frac{x}{1+x}} \, dx$$

$$(15) \int \sqrt{4x^2-1} \, dx$$

$$(16) \int x^2 \sqrt{1+x^2} \, dx$$

$$(17) \int \frac{1}{\sqrt{x(x+1)}} \, dx$$

$$(18) \int \frac{x^2}{\sqrt{x^6-1}} \, dx$$

$$(19) \int_0^4 \frac{4x+1}{\sqrt{x^2+9}} \, dx$$

$$(20) \int_0^1 \sqrt{16x^2 + 9} \, dx$$

$$(21) \int \sqrt{\frac{x+1}{x}} \, dx$$

$$(22) \int \frac{1}{(2x^2+3)^{\frac{3}{2}}} \, dx$$

$$(23) \int \operatorname{cosech}(3x) \coth(3x) \, dx$$

$$(24) \text{ Show that } \int_1^{\sqrt{2}} \frac{r^2}{\sqrt{r^2-1}} \, dr = \frac{1}{2}(\sqrt{2} + \ln(\sqrt{2} + 1))$$