

Section 14.4, problem 10:

$$\int \frac{1}{\sqrt{x-5}} dx = \int (x-5)^{-1/2} dx = \dots$$

Substitute $u = x - 5 \implies du = dx$

$$\dots = \int u^{-1/2} du = \frac{u^{1/2}}{1/2} + C = 2u^{1/2} + C = 2(x-5)^{1/2} + C.$$

Section 14.4, problem 82:

(1) *Integrate:* using the substitution $u = x^2 + 6 \implies du = 2x dx \implies x dx = \frac{1}{2} du$:

$$\int \frac{x}{x^2 + 6} dx = \int \underbrace{\frac{x dx}{x^2 + 6}}_{u} = \frac{1}{2} \int \frac{1}{u} du = \frac{1}{2} \ln|u| + C = \frac{1}{2} \ln(x^2 + 6) + C,$$

so

$$y = \frac{1}{2} \ln(x^2 + 6) + C.$$

 Note that we can drop the absolute value because $x^2 + 6 > 0$ for all x .

(2) *Solve for C:*

$$0 = y(1) = \frac{1}{2} \ln(1^2 + 6) + C = \frac{1}{2} \ln(7) + C \implies C = -\frac{1}{2} \ln 7,$$

so

$$y = \frac{1}{2} \ln(x^2 + 6) - \frac{1}{2} \ln 7 \quad \left(= \frac{1}{2} \ln \left(\frac{x^2 + 6}{7} \right) \right)$$

Section 14.5, problem 10:

$$\int \frac{e^x + 1}{e^x} dx = \int 1 + e^{-x} dx = \int 1 dx + \int e^{-x} dx = x - e^{-x} + C,$$

(using the substitution $u = -x \implies du = -dx$ in the second integral on the right).