

8.7)

$$b) \int \frac{u}{u^2+4u+3} du$$

$$N(x) = u^2 + 4u + 3$$

$$u_{1/2} = -\frac{4}{2} \pm \sqrt{\left(\frac{4}{2}\right)^2 - 3}$$

$$= -\frac{4}{2} \pm \sqrt{\frac{16}{4} - 3}$$

$$= -2 \pm 1 \Rightarrow u_1 = -3, u_2 = -1 \Rightarrow N(u) = (u+3)(u+1)$$

$$\frac{u}{u^2+4u+3} = \frac{A}{u+3} + \frac{B}{u+1}$$

$$u = A(u+1) + B(u+3)$$

$$u = -1 \Rightarrow -1 = 2B \Rightarrow B = -\frac{1}{2}$$

$$u = -3 \Rightarrow -3 = -2A \Rightarrow A = \frac{3}{2}$$

$$\frac{u}{u^2+4u+3} = \frac{3}{2(u+3)} - \frac{1}{2(u+1)}$$

$$\int \frac{u}{u^2+4u+3} = \int \frac{3}{2(u+3)} - \int \frac{1}{2(u+1)} = 3 \int \frac{1}{2(u+3)} - \int \frac{1}{2(u+1)} = 3 \ln(|2u+6|) - \ln(|2u+2|)$$