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QUIZ 8

MATH 201  
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$$\begin{aligned} 1. \int_0^{\pi/4} \tan(x) dx &= \left[ \ln |\sec(x)| \right]_0^{\pi/4} \\ &= \ln \left| \sec\left(\frac{\pi}{4}\right) \right| - \ln |\sec(0)| \\ &= \ln \left| \frac{2}{\sqrt{2}} \right| - \ln |1| \\ &= \boxed{\ln |\sqrt{2}|} \end{aligned}$$

$$2. \int \frac{x^2 + 6x + 9}{x+1} dx = \int x + 5 + \frac{4}{x+1} dx = \boxed{\frac{x^2}{2} + 5x + 4 \ln |x+1| + C}$$

$$\begin{array}{r} x+5 \\ x+1 \overline{) x^2 + 6x + 9} \\ \underline{x^2 + x} \phantom{+ 9} \\ 5x + 9 \\ \underline{5x + 5} \\ 4 \end{array}$$

$$\begin{aligned} 1. \int_0^{\pi/4} \sec(x) dx &= \left[ \ln |\sec(x) + \tan(x)| \right]_0^{\pi/4} \\ &= \ln |\sec(\pi/4) + \tan(\pi/4)| - \ln |\sec(0) + \tan(0)| \\ &= \ln \left| \frac{2}{\sqrt{2}} + 1 \right| - \ln |1+0| \\ &= \ln \left| \frac{2}{\sqrt{2}} + 1 \right| \\ &= \ln \left| \frac{2+\sqrt{2}}{\sqrt{2}} \right| \\ &= \ln \left| \frac{2\sqrt{2}+2}{2} \right| \\ &= \boxed{\ln |\sqrt{2} + 1|} \end{aligned}$$

$$\begin{aligned} 2. \int \frac{1}{x^2 + 6x + 10} dx &= \int \frac{1}{x^2 + 6x + 9 - 9 + 10} = \int \frac{dx}{(x+3)^2 + 1} \quad \begin{array}{l} u = x+3 \\ du = dx \end{array} \\ &= \int \frac{du}{u^2 + 1} = \tan^{-1}(u) + C \\ &= \boxed{\tan^{-1}(x+3) + C} \end{aligned}$$