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Week #2 Group G

12/9/22

$$1. \int \frac{-7e^x}{e^x+1} dx \quad -7 \cdot \int \frac{e^x}{e^x+1} dx$$

$$u = e^x + 1 \quad = -7 \cdot \int \frac{1}{u} du \quad \int \frac{1}{u} du = \ln|u| + C$$
$$du = e^x dx$$

$$-7 \cdot \ln|u| + C = \boxed{-7 \cdot \ln|e^x + 1| + C}$$

$$2. \int \frac{x+1}{x^2+2x+2} dx$$

$$u = x^2 + 2x + 3$$

$$du = 2x + 2 dx = 2(x+1) dx$$

$$\frac{du}{2} = \frac{2(x+1) dx}{2} = \frac{1}{2} du = (x+1) dx$$

$$\int \frac{1}{u} du = \ln|u| + C$$

$$= \frac{1}{2} \cdot \int \frac{1}{u} du$$

$$\frac{1}{2} \cdot \ln|u| + C = \boxed{\frac{1}{2} \cdot \ln|x^2 + 2x + 3| + C}$$

$$3. \int x^3 (x^4 + 7)^{\frac{1}{2}} dx$$

$$u = x^4 + 7$$

$$\frac{du}{4} = \frac{4x^3 dx}{4} = \frac{1}{4} du = x^3 dx$$

$$= \frac{1}{4} \cdot \int (u)^{\frac{1}{2}} du$$

$$= \frac{1}{4} \cdot \left[\frac{u^{\frac{3}{2}}}{\frac{3}{2}} \right] + C$$

$$\frac{x^{n+1}}{n+1}$$

$$= \frac{1}{4} \cdot \left[\frac{2}{3} u^{\frac{3}{2}} \right] + C = \frac{2}{12} (x^4 + 7)^{\frac{3}{2}} + C$$

$$= \boxed{\frac{1}{6} (x^4 + 7)^{\frac{3}{2}} + C}$$