

continued

$$\int e^x \sin(5x) dx = \frac{25}{26} \left[ -\frac{1}{5} e^x \cos(5x) + \frac{1}{25} e^x \sin(5x) \right] + C$$

$$\int e^x \sin(5x) dx = \frac{-5}{26} e^x \cos(5x) + \frac{1}{26} e^x \sin(5x) + C$$

2) Evaluate each indefinite integral.

(5 points each)

a)  $\int 2 \ln(x) dx$

$$u = 2 \ln x$$

$$dv = dx$$

$$du = \frac{2}{x} dx$$

$$v = x$$

$$= uv - \int v du$$

$$= 2x \ln x - \int x \cdot \frac{2}{x} dx$$

$$= 2x \ln x - \int 2 dx = 2x \ln x - 2x + C$$

b)  $\int e^x \sin(5x) dx$

$$u = e^x$$

$$dv = \sin(5x) dx$$

$$du = e^x dx$$

$$v = -\frac{1}{5} \cos(5x)$$

$$= uv - v du$$

$$= -\frac{1}{5} e^x \cos(5x) - \int -\frac{1}{5} e^x \cos(5x) dx$$

$$= -\frac{1}{5} e^x \cos(5x) + \frac{1}{5} \int e^x \cos(5x) dx$$

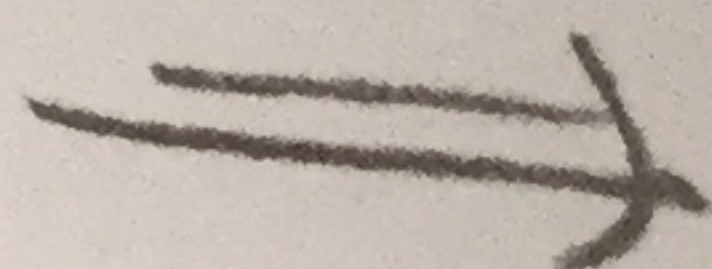
$$u = e^x \quad dv = \cos(5x) dx$$

$$du = e^x dx \quad v = \frac{1}{5} \sin(5x)$$

$$= -\frac{1}{5} e^x \cos(5x) + \frac{1}{5} \left[ \frac{1}{5} e^x \sin(5x) - \int \frac{1}{5} e^x \sin(5x) dx \right]$$

$$\int e^x \sin(5x) dx = -\frac{1}{5} e^x \cos(5x) + \frac{1}{25} e^x \sin(5x) - \frac{1}{25} \int e^x \sin(5x) dx$$

$$\frac{26}{25} \int e^x \sin(5x) dx = -\frac{1}{5} e^x \cos(5x) + \frac{1}{25} e^x \sin(5x)$$



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MA 182 Dr. Katiraie

Quiz 2 Sections 5.5 & 5.6 Fall 2013

1) Evaluate the following indefinite integrals

(2.5 points each)

(a)  $\int e^x \sqrt{1+e^x} dx$

$$u = 1 + e^x$$
$$du = e^x dx$$

$$\int u^{\frac{1}{2}} du = \frac{u^{\frac{3}{2}}}{\frac{3}{2}} + C = \frac{2}{3} u^{\frac{3}{2}} + C$$
$$= \frac{2}{3} (1+e^x)^{\frac{3}{2}} + C$$

(b)  $\int \frac{\sin \sqrt{x}}{\sqrt{x}} dx$

$$u = \sqrt{x}$$

$$du = \frac{1}{2} x^{-\frac{1}{2}} dx \Rightarrow dx = \frac{2 du}{x^{-\frac{1}{2}}} = 2x^{\frac{1}{2}} du$$

$$\int \sin u \cdot \frac{1}{\sqrt{x}} \cdot 2x^{\frac{1}{2}} du$$

$$= 2 \int \sin u du = -2 \cos \sqrt{x} + C$$

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

$$u = x^3 + 1$$

$$du = 3x^2 dx$$

$$\frac{1}{3} \int \frac{3x^2 dx}{x^3+1} = \frac{1}{3} \int \frac{du}{u} = \frac{1}{3} \ln|u| + C = \frac{1}{3} \ln|x^3+1| + C$$

(d)  $\int \sin(3\pi t) dt$

$$u = 3\pi t$$

$$du = 3\pi dt$$

$$\frac{1}{3\pi} \int \sin(3\pi t) \cdot 3\pi dt = \frac{1}{3\pi} \int \sin u du = -\frac{1}{3\pi} \cos(3\pi t) + C$$

$$\left( \frac{-5}{26} e^x \cos(5x) + \frac{1}{26} e^x \sin(5x) + C \right)'$$

$$\cancel{\frac{-5}{26} e^x \cos(5x)} + \frac{5}{26} e^x \sin(5x) \cdot 5 + \frac{1}{26} e^x \sin(5x)$$

$$+ \cancel{\frac{1}{26} e^x \cos(5x) \cdot 5}$$

$$= \frac{25}{26} e^x \sin(5x) + \frac{1}{26} e^x \sin(5x)$$

$$= \frac{26}{26} e^x \sin(5x)$$

$$= e^x \sin(5x)$$

$$\int e^x \sin(5x) dx = \frac{-5}{26} e^x \cos(5x) + \frac{1}{26} e^x \sin(5x) + C$$