continued

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

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

(5 points each)

2) Evaluate each indefinite integral.

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

$u = 2\ln x$ $\quad dv = dx$

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

$= uv - \int v\,du$

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

$= 2x\ln x - \int 2\,dx = \boxed{2x\ln x - 2x + C}$

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

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

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

$= uv - v\,du$

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

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

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

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

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

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

$\Longrightarrow$

Name: ______________________________

MA 182 Dr. Katiraie Quiz 2 Sections 5.5 & 5.6 Fall 2013

1) Evaluate the following indefinite integrals (2.5 points each)

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

$u = 1+e^x$

$du = e^x\,dx$

$\int u^{\frac{1}{2}}\,du = \frac{u^{3/2}}{\frac{3}{2}} + c = \frac{2}{3}u^{\frac{3}{2}} + c$

$= \frac{2}{3}(1+e^x)^{\frac{3}{2}} + c$

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

$u = \sqrt{x}$

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

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

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

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

$u = 3\pi t$

$du = 3\pi\,dt$

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

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

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

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

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

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

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

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