answer to bonus B:

$$-\frac{\pi}{2}+\frac{2\pi}{3}-2\sqrt{3}+4 \approx 1.059$$

Bonus A

$$\int \cos^3 x\,dx = \int (1-\sin^2 x)\cos x\,dx$$

$u=\sin x$

$du=\cos x\,dx$

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

$$= \boxed{\sin x-\frac{1}{3}\sin^3 x+C}$$

Bonus C

$$S(x)=\int_0^x \sin\left(\frac{\pi t^2}{2}\right)dt \qquad (0,3)$$

$$S'(x)=\sin\frac{\pi x^2}{2}=0$$

$$\frac{\pi x^2}{2}=0+\pi k \quad , k\in\mathbb{Z}$$

$$\pi x^2=2\pi k$$

$$x^2=2k$$

$$x=\sqrt{2k} = \boxed{\sqrt{2},\ 2,\ \sqrt{6},\ 2\sqrt{2}}$$

7.2 Integration by Parts

$$\frac{d}{dx}[uv] = u \cdot \frac{d}{dx}[v] + v \cdot \frac{d}{dx}[u]$$

$$= uv' + vu'$$

Integrating both sides w.r.t. x yields:

$$uv = \int uv'dx + \int vu'dx$$

$$uv = \int u\,dv + \int v\,du$$

Rearranging yields:

$$\boxed{\int u\,dv = uv - \int v\,du}$$

$$\int xe^x dx$$

$$\int u\,dv = uv - \int v\,du$$

$u = x$ $\quad dv = e^x dx$

$du = dx$ $\quad \int dv = \int e^x dx$

$v = e^x$

$$\int xe^x dx = xe^x - \int e^x dx$$

$$= \boxed{xe^x - e^x + C}$$

6. $\int x^2 e^{2x}dx = \frac{1}{2}x^2e^{2x} - \int \frac{1}{\cancel{2}}e^{2x}\cdot\cancel{2}x\,dx$

$u=x^2 \quad dv=e^{2x}dx$

$du=2x\,dx \quad v=\frac{1}{2}e^{2x}$

$u=x \quad dv=e^{2x}dx$

$du=dx \quad v=\frac{1}{2}e^{2x}$

$= \frac{1}{2}x^2e^{2x} - \left(\frac{1}{2}xe^{2x} - \int \frac{1}{2}e^{2x}dx\right)$

$= \boxed{\frac{1}{2}x^2e^{2x} - \frac{1}{2}xe^{2x} + \frac{1}{4}e^{2x} + C}$

16. $\int x^4 \ln x\,dx = \frac{1}{5}x^5\ln x - \int \frac{1}{5}x^5\cdot\frac{1}{x}dx$

$u=\ln x \quad dv=x^4dx$

$du=\frac{1}{x}dx \quad v=\frac{1}{5}x^5$

$= \frac{1}{5}x^5\ln x - \frac{1}{5}\int x^4dx$

$= \boxed{\frac{1}{5}x^5\ln x - \frac{1}{25}x^5 + C}$

34. $\int 4\arccos x\,dx = 4x\arccos x + \int \frac{+4x}{\sqrt{1-x^2}}dx$

$u=\arccos x \quad dv=4dx \qquad w=1-x^2$

$du=\frac{-1}{\sqrt{1-x^2}}dx \quad v=4x \qquad dw=-2x\,dx$

$-2dw=4x\,dx$

$= 4x\arccos x + \int \frac{-2dw}{\sqrt{w}}$

$= 4x\arccos x + \int -2w^{-1/2}dw$

$= 4x\arccos x - 4w^{1/2}$

$= \boxed{4x\arccos x - 4\sqrt{1-x^2} + C}$

30. $\int x^2\cos x\,dx = x^2\sin x + 2x\cos x - 2\sin x + C$?

$u=x^2 \quad dv=\cos x\,dx$

$du=2x\,dx \quad v=\sin x$

$x^2\sin x - \int 2x\sin x\,dx$

$u=2x \quad dv=\sin x\,dx$

$du=2dx \quad v=-\cos x$

$x^2\sin x - \left(-2x\cos x - \int -2\cos x\,dx\right)$

$\boxed{x^2\sin x + 2x\cos x - 2\sin x + C}$

36. $\int e^x \cos 2x \, dx$

$u = \cos 2x \qquad dv = e^x dx$

$du = -2\sin 2x \, dx \qquad v = e^x$

$\int e^x \cos 2x \, dx = e^x \cos 2x - \int -2e^x \sin 2x \, dx$

HW: 7.2 #1-35 odd

$= e^x \cos 2x + 2\int e^x \sin 2x \, dx$

$u = \sin 2x \qquad dv = e^x dx$

$du = 2\cos 2x \, dx \qquad v = e^x$

$\int e^x \cos 2x \, dx = e^x \cos 2x + 2\left(e^x \sin 2x - \int 2e^x \cos 2x \, dx\right)$

$\int e^x \cos 2x \, dx = e^x \cos 2x + 2e^x \sin 2x - 4\int e^x \cos 2x \, dx$

$5\int e^x \cos 2x \, dx = e^x \cos 2x + 2e^x \sin 2x$

$\int e^x \cos 2x \, dx = \boxed{\frac{1}{5}e^x \cos 2x + \frac{2}{5}e^x \sin 2x + C}$