$$= 2\int \sin x\,dx + \frac{1}{3}\int 3\cos 3x\,dx + (-1)\int -e^{-x}\,dx$$

$$= 2(-\cos x) + \frac{1}{3}\sin 3x - e^{-x} + C$$

$$F(0) = -2\underbrace{\cos 0}_{=1} + \frac{1}{3}\underbrace{\sin 0}_{=0} - \underbrace{e^0}_{=1} + C = -2 - 1 + C = 6 \Leftrightarrow C = 9$$

$$\Rightarrow F(x) = -2\cos x + \frac{1}{3}\sin 3x - e^{-x} + 9$$

9.10 $\varphi''(x) = \cos x + 2\sin 4x$, $\varphi'(0) = \frac{1}{2}$, $\varphi(0) = 4$

$$\varphi'(x) = \int (\cos x + 2\sin 4x)\,dx$$

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

$$= \sin x + 2\cdot\frac{1}{4}\int 4\sin 4x\,dx = \sin x + \frac{1}{2}(-\cos 4x) + C$$

$$\varphi'(0) = \underbrace{\sin 0}_{=0} - \frac{1}{2}\underbrace{\cos 0}_{=1} + C = -\frac{1}{2} + C = \frac{1}{2} \Leftrightarrow C = 1$$

$$\varphi(x) = \int \varphi'(x)\,dx = \int (\sin x - \tfrac{1}{2}\cos 4x + 1)\,dx$$

$$= \int \sin x\,dx - \frac{1}{2}\int \cos 4x\,dx + \int 1\,dx$$

$$= -\cos x - \frac{1}{2}\cdot\frac{1}{4}\int 4\cos 4x\,dx + x$$

$$= -\cos x - \frac{1}{8}\sin 4x + x + D$$

$$\varphi(0) = -\underbrace{\cos 0}_{=1} - \frac{1}{8}\underbrace{\sin 0}_{=0} + 0 + D = -1 + D = 4 \Leftrightarrow D = 5$$

Vark. $\varphi(x) = -\cos x - \frac{1}{8}\sin 4x + x + 5$

9.15 a) $\int e^{\cos x}\sin x\,dx = -\int \underbrace{-\sin x}_{\varphi'(x)}\cdot e^{\underbrace{\cos x}_{\varphi(x)}}\,dx = -e^{\cos x} + C$

b) $\int e^{3x}\cos e^{3x}\,dx = \frac{1}{3}\int \underbrace{3e^{3x}}_{\varphi'(x)}\cos\underbrace{e^{3x}}_{\varphi(x)}\,dx$ $\qquad De^{3x} = e^{3x}\cdot 3$

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

9.5 $\varphi(x) = \cos x \sin x$

$$F(x) = \int \cos x\sin x\,dx = \int \underbrace{\cos x}_{g'(x)}\underbrace{(\sin x)'}_{g(x)}\,dx = \frac{1}{2}(\sin x)^2 + C$$

$$F(\pi) = \frac{1}{2}\underbrace{(\sin\pi)}_{=0}^2 + C = C = 3 \qquad \text{Vark. } F(x) = \frac{1}{2}\sin^2 x + 3$$

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$$F(x) = \int \cos x\sin x\,dx = \int \frac{1}{2}\cdot\underbrace{2\sin x\cos x}_{=\sin 2x}\,dx = \frac{1}{2}\cdot\frac{1}{2}\int 2\sin 2x\,dx = \frac{1}{4}(-\cos 2x) + C$$