$$\int \sqrt{x}\,dx = \int x^{1/2}\,dx$$

$$= \frac{1}{\frac{1}{2}+1} x^{\frac{1}{2}+1} + C$$

$$= \frac{1}{3/2} x^{3/2} + C = \frac{2}{3}\sqrt{x^3} + C$$

1.1.c)

aus a) $\int x\sqrt{x+1}\,dx = \frac{2}{5}x(x+1)^{3/2} - \frac{2}{3}\frac{2}{5}(x+1)^{5/2}$

aus b) $\int x\sqrt{x+1}\,dx = \frac{2}{5}(x+1)^{5/2} - \frac{2}{3}(x+1)^{3/2}$

$\frac{5}{2} = \frac{3}{2} + \frac{2}{2} \Rightarrow (x+1)^{5/2} = (x+1)^{3/2}(x+1)^{2/2}$

$= (x+1)^{3/2}(x+1)$

a) ... $= \frac{2}{5}x(x+1)^{3/2} - \frac{2}{3}\frac{2}{5}(x+1)^{3/2}(x+1)$

$= \frac{2}{5}(x+1)^{3/2}\left(x - \frac{2}{3}(x+1)\right)$

$= \boxed{\frac{2}{5}(x+1)^{3/2}\left(\frac{3}{5}x - \frac{2}{3}\right)}$

b) ... $= \frac{2}{5}(x+1)^{3/2}(x+1) - \frac{2}{3}(x+1)^{3/2}$

$= (x+1)^{3/2}\left(\frac{2}{5}(x+1) - \frac{2}{3}\right)$

$= (x+1)^{3/2}\left(\frac{2}{5}x + \frac{2}{5}\cdot\frac{3}{3} - \frac{2}{3}\cdot\frac{5}{5}\right) = (x+1)^{3/2}\left(\frac{2}{5}x - \frac{4}{15}\right)$

$-\frac{4}{15}$

$= (x+1)^{3/2}\left(\frac{2}{3}\cdot\frac{3}{2}\cdot\frac{2}{5}x - \frac{2\cdot 2}{3\cdot 5}\right) = \boxed{\frac{2}{3}(x+1)^{3/2}\left(\frac{3}{5}x - \frac{2}{5}\right)}$

1.2 b)

$$\int \sin 3x \cos 3x \, dx$$

$$= \frac{1}{2} \int 2 \sin 3x \cos 3x \, dx$$

$$= \frac{1}{2} \int \sin 6x \, dx$$

$$= \boxed{-\frac{1}{2} \cdot \frac{1}{6} \cos 6x} + C$$

Vgl. Math 1 Kap 7, S. 36

$\Rightarrow a = 6$

$f = \sin x \Rightarrow F = -\cos x$

$$\int \underbrace{\sin 3x}_{z} \underbrace{\cos 3x \, dx}_{\frac{1}{3} dz}$$

$z = \sin 3x$

$\frac{dz}{dx} = 3 \cos 3x$

$\Rightarrow \frac{1}{3} dz = \cos 3x \, dx$

$$= \frac{1}{3} \int z \, dz$$

$$= \frac{1}{3} \frac{1}{2} z^2 + C$$

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

$\Rightarrow$ Was hat das mit einander zu tun?

$\sin^2 y + \cos^2 y = 1 \Rightarrow \sin^2 y = 1 - \cos^2 y$

$y = 3x$

$$\frac{1}{6} \frac{1}{2} (1 - \cos 6x)$$

$$= \boxed{-\frac{1}{2} \frac{1}{6} \cos 6x} + \underbrace{\frac{1}{6} \cdot \frac{1}{2}}_{D = \text{konst.}}$$

Nur andere Konstante $\Rightarrow$ Egal!