Opgave 2:

a) $$\int_0^1 x^2 + \sqrt{x} + 2x \, dx = \left[\frac{1}{3}x^3 + \frac{2}{3}x^{\frac{3}{2}} + x^2\right]_0^1$$
$$= \frac{1}{3} + \frac{2}{3} + \frac{3}{3} = \underline{\underline{2}}$$

b) $$\int_{-1}^{1} \frac{e^x - e^{-x}}{2} \, dx = \frac{1}{2}\int_{-1}^{1} e^x - e^{-x} \, dx$$
$$= \frac{1}{2}\left[e^x + e^{-x}\right]_{-1}^{1} =$$
$$= \frac{1}{2}\left(e^1 + e^{-1} - e^{-1} + e^1\right) = \underline{\underline{0}}$$

c) $$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} f(x), \quad -f(x) = \begin{cases} \sin(x), & x \leq 0 \\ 4x, & x > 0 \end{cases}$$

$$\int_{-\frac{\pi}{2}}^{0} \sin(x)\,dx + \int_{0}^{\frac{\pi}{2}} 4x \, dx = \left[-\cos(x)\right]_{-\frac{\pi}{2}}^{0} + \left[2x^2\right]_{0}^{\frac{\pi}{2}}$$

$$\left(-\cos(0) + \cos\left(\frac{\pi}{2}\right)\right) + \left(2 \cdot \left(\frac{\pi}{2}\right)^2 + 0\right) \approx \underline{\underline{3.935}}$$