Oppgave 3

$$\frac{d}{dx}\int_{\sqrt{x}}^{x^2} u - \frac{1}{\sqrt{u}}\,du$$

Leibniz' regel: $\frac{d}{dx}\int_{h(x)}^{g(x)} f(y)\,dy = f(g(x))\,g'(x) - f(h(x))\cdot h'(x)$

$g(x) = x^2$

$h(x) = \sqrt{x}$

Deriver begge:

$g'(x) = 2x$

$h'(x) = \frac{1}{2\sqrt{x}}$

$f(g(x))\,g'(x) = \left(x^2 - \frac{1}{\sqrt{x^2}}\right)(2x) = \underline{2x^3 - 2}$

~~$f(h(x))\,h'(x) = \left(\sqrt{x} - \frac{1}{\sqrt{\sqrt{x}}}\right)\cdot\frac{1}{2\sqrt{x}}$~~

$f(h(x))\,h'(x) = \left(\sqrt{x} - \frac{1}{\sqrt{\sqrt{x}}}\right)\cdot\frac{1}{2\sqrt{x}} = \frac{1}{2} - \frac{1}{2x^{\frac{3}{4}}}$

$$\frac{d}{dx}\int_{\sqrt{x}}^{x^2} u - \frac{1}{\sqrt{u}}\,du = 2x - 2 - \frac{1}{2} + \frac{1}{2x^{\frac{3}{4}}} = \underline{\underline{2x - \frac{5}{2} - \frac{1}{2x^{\frac{3}{4}}}}}$$