4 b) a) find $\chi^2_{.05;2}$, $\underline{5.992}$

b) integrate the pdf.

$$f(x) = \begin{cases} \dfrac{x^{\nu/2 - 1} e^{-x^2/2}}{2^{\nu/2}\,\Gamma(\frac{\nu}{2})} & x \geq 0 \\ 0 & \text{ellers} \end{cases}$$

setter inn verdier

$$f_2(x) = \frac{x^{1-1} e^{-x^2/2}}{2\,\Gamma(1)} \;/\; \Gamma(1) = 1$$

$$\left(e^{-x^2/2}\right)' = e^{-x^2}\left(\frac{-x^2}{2}\right)'$$
$$= -x$$

$$0{,}05 = \int_c^\infty \frac{1}{2} e^{-x/2} = \left[-e^{-x/2}\right]_c^\infty$$

$$= \lim_{x \to \infty} - \overset{0}{\underset{|}{e^{-x/2}}} - \left(-e^{-c/2}\right)$$

$$0{,}05 = e^{-c/2}$$

$$\ln(0{,}05) = -c/2$$

$$-2\ln(0{,}05) = c = 5{,}991$$

4 f Why should χ_v^2 be approximately normal for large v? What theorem, and why?

4 g Vis at χ_v^2 har maksimum på $v-2$ hvis $v>2$

$x^* = v-2$, $f(x^*) \geq f(x)$

$$f(x) = \frac{1}{2^{v/2}\,\Gamma\frac{v}{2}}\, x^{v/2-1}\, e^{-x/2}$$

Skriver om til $\ln(f(x))$

$$= -\frac{v}{2}\ln 2 - \ln\left(\Gamma\left(\frac{v}{2}\right)\right) + \left(\frac{v}{2}-1\right)\ln(x) - \frac{x}{2}$$

$$0 = \frac{d\ln f(x)}{dx} = \left(\frac{v}{2}-1\right)\frac{1}{x} - \frac{1}{2} \Rightarrow x = v-2$$

så ver.

$x \leq 2$, så er $v-2 \geq 0 = v \geq 2$