· I morgen: Tekna krasjkurs (gjennomgang av tidligere midtveiser)
· Onsdag: Snuble orakel m/ Karoline (midtveis 2015)

5.4.1 B)
$$\lim_{x\to 0^+} \frac{x^4+\sqrt{x}+e^{x^2}}{7+\sin(\sqrt{x})} = \frac{0+0+1}{7} = \frac{1}{7}$$

Husk
$$\lim \frac{f}{g} = \frac{\lim f}{\lim g}$$
$$\lim(fg) = \lim f \cdot \lim g$$
(osv)

(Går det an å sette inn null?) Ja

5.4.2 B) V.a. $\lim_{x\to 3} x^2 = 9$ v/ definisjonen.

Husk Vi sier at $\lim_{x\to 3} f(x) = a$ hvis det for alle $\varepsilon > 0$ finnes en $\delta > 0$ slik at $|f(x) - a| < \varepsilon$ når $0 < |x-a| < \varepsilon$

$$|x^2-9| = |x-3||x+3| < \delta|x+3| < \delta(\delta+6)$$

Vil ha denne minst mulig

$$|x+3| = |x-3+3+3| \leq |x-3| + 6 < \delta + 6$$

$< 7\delta < \varepsilon$. (Om vi antar $\delta < 1$)

Hvis vi velger $\delta = \min\{\frac{\varepsilon}{7}, 1\}$ vil funksjonsforskjellen være $< \varepsilon$.

5.4.3 a)
$$\lim_{x\to 0} \frac{7x^2+4x^4}{3x^3-2x^2} = \lim_{x\to 0} \frac{x^2(7+4x^2)}{x^2(3x-2)} = \lim_{x\to 0} \frac{7+4x^2}{3x-2} = \frac{7}{-2}$$

x er aldri lik null, så vi kan dele

b)
$$\lim_{x\to\infty} \sqrt{x^2+3x} - x = \lim_{x\to\infty} x\left(\sqrt{1+\frac{3}{x}} - 1\right)$$
$$= \lim_{x\to\infty} \frac{\sqrt{1+\frac{3}{x}} - 1}{\frac{1}{x}} = \lim_{y\to 0} \frac{\sqrt{1+3y} - 1}{y}$$

Sett $x = \frac{1}{y}$, $y = \frac{1}{x}$

$(a-b)(a+b) = a^2 - b^2$

$$= \lim_{y\to 0} \frac{(\sqrt{1+3y}-1)(\sqrt{1+3y}+1)}{y(\sqrt{1+3y}+1)} = \lim_{y\to 0} \frac{\cancel{1}+3y-\cancel{1}}{y(\sqrt{1+3y}+1)}$$
$$= \lim \frac{3}{\sqrt{1+3y}+1} = \frac{3}{2}.$$

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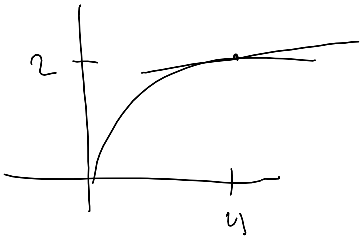
d) $\lim_{x\to 4} \frac{\sqrt{x}-2}{x-4} = \lim_{x\to 4} \frac{(\sqrt{x}-2)(\sqrt{x}+2)}{(x-4)(\sqrt{x}+2)} = \lim_{x\to 4} \frac{\cancel{x-4}}{\cancel{(x-4)}(\sqrt{x}+2)}$



$= \lim_{x\to 4} \frac{1}{\sqrt{x}+2} = \underline{\underline{\frac{1}{4}}}$

Bevis

$[\ln f(x)]' = \frac{1}{f(x)} f'(x)$

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6.1.3 Husk $f'(x) = f(x) \cdot D[\ln|f(x)|]$

a) $f(x) = x^2 \cdot \cos^4 x \cdot e^x$

$D[\ln f(x)] = D[2\ln x + 4\ln\cos x + x]$

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

$= \frac{2}{x} - 4\tan x + 1$

Så $f'(x) = x^2 \cos^4 x \, e^x \left(\frac{2}{x} - 4\tan x + 1\right)$. ✓

$\ln(ab) = \ln a + \ln b$

$\ln a^b = b\ln a$