LIKNINGER 11

0) $g = 9{,}8\,2\,1\,4\,6\,7\,5$

s_0: start posisjon, v_0: startfart

$v_x = v_0 \cos\theta$

$v_y = v_0 \sin\theta - g t$

$r_x =$

1) $k\,\theta = m\,l \cos\theta$

$\theta = \frac{ml}{k}\cos\theta \qquad \frac{ml}{k} = 1$

$\underline{\theta = \cos\theta}$ Trakke du går aus

2) Istilig

3) 84

4) $x \ln x = 1$

$\underline{x = \frac{1}{\ln x}}$

$x \ln x = 1$

$\ln x = \frac{1}{x}$

$e^{\ln x} = e^{\frac{1}{x}}$

$\underline{x = e^{\frac{1}{x}}}$

Fikk ikke til

Oppg 5)

$f(x) = 0$

$x_{n+1} = x_n - \frac{f(x)}{f'(x)}$

$x = \cos x$

$\frac{\cos x}{x} = 1$

$\frac{\cos x}{x} - 1 = 0$

$f(x) = \frac{\cos x}{x} - 1$

$f'(x) = \frac{-x\sin x - \cos x}{x^2}$

$x = \cos x$

$$\frac{x}{\cos x} = 1$$

$$\frac{x}{\cos x} - 1 = 0 = f(x)$$

$$f'(x) = \frac{\cos x + x \sin x}{\cos^2(x)}$$

$x = \cos x$

$x - \cos x = 0 = f(x)$

$f'(x) = \sin x$

Feiler for feil stor verdi av x_0?

Oppg 6 & 7) KVG

Oppg 8) $h = \cos \theta$

$2 \sin 2\theta + \pi - 4\theta = 0$

$4\theta = 2 \sin(2\theta) + \pi$

$\theta = \frac{1}{2} \sin(2\theta) + \frac{1}{4}\pi$

$f(\theta) = 2 \sin 2\theta + \pi - 4\theta$

$f'(\theta) = 4 \cos 2\theta - 4$

Oppg 9)

$x^3 + x^2 + x + 1 = 0$

$f'(x) = 3x^2 + 2x + 1$

$x = -x^3 - x^2 - 1$

$x^3 + x^2 + x +$

$x_0 = 1 + 0j$ $\quad x_1 = -1 + 0j$

$x_0 = 0 + 1j$ $\quad x_2 = 0 + 1j$

$x_3 = 0 - 1j$

$$\underline{\underline{p(x) = (x+1)(x-j)(x+j)}}$$

Oppg 10) Konvergerer ikke

Oppg 1 1)

$$\tan\sqrt{x} = \frac{2\sqrt{x(1-x)}}{2x-1}$$

$$x = \arctan^2\left(\frac{2\sqrt{x(1-x)}}{2x-1}\right)$$

$$x \approx -1\,9$$

Oppg 1 2) $y = e^{-ax^2}$ $y = bx^2$ $a > 0, \; b > 0$

$$a = b = 1$$

$$e^{-x^2} = x^2 \quad |\cdot \ln$$

$$x = \sqrt{e^{-x^2}}$$

$$x \approx 0{,}753$$

Oppg 1 5)

$$x^3 + x^2 - 3x - 3 = 0$$

$$3x = x^3 + x^2 - 3$$

$$x = \frac{1}{3}(x^3 + x^2) - 1$$

$$x_1 = -1 + 0j$$

$$(x^3 + x^2 - 3x - 3) : (x + 1) = x^2 - 3$$

$$-(x^3 + x^2)$$

$$-3x - 3$$

$$-(-3x - 3)$$

$$0$$

$$x = \pm\sqrt{3}$$

$$(x-1)(x-\sqrt{3})(x+\sqrt{3})$$

16) $p(x) = x^4 - 10x^3 + 35x^2 - 50x + 24$

$p'(x) = 4x^3 - 30x^2 + 70x - 50$

$q(x) = x^4 - 9x^3 + 27x^2 - 31x + 12$

$q'(x) = 4x^3 - 27x^2 + 54x - 31$

17)

$y - y_0 = a(x - x_0)$

$y - f(x_0) = f'(x_0)(x_1 - x_0)$

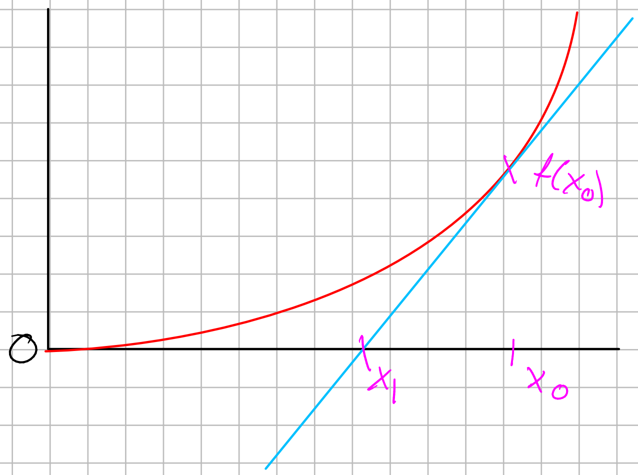
$y = 0$

$-f(x_0) = f'(x_0)(x_1 - x_0)$

$x_1 - x_0 = -\frac{f(x_0)}{f'(x_0)}$

$x_1 = x_0 - \frac{f(x_0)}{f'(x_0)}$

$$\underline{\underline{x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}}}$$



18) $g'(s) = \frac{g(x_n) - g(r)}{x_n - r} = \frac{x_{n+1} - r}{x_n - r}$

1 9) $\left\{\frac{n+1}{n}\right\}_{n=1}^{\infty} = \left\{\frac{2}{1}, \frac{3}{2}, \frac{4}{3}, \dots\right\}$

$$\lim_{n\to} \frac{n+1}{n} = 1$$

Det finnes en N, slik at $n \geq N$, slik at for $\varepsilon > 0$

$$\left|\frac{n+1}{n} - 1\right| < \varepsilon$$

$$\lim_{n\to\infty} \frac{n+1}{n} = \lim_{n\to\infty} \frac{\cancel{n}}{\cancel{n}} + \frac{1}{n} = \lim_{n\to\infty} 1 + \frac{1}{n} = 1 + 0 = \underline{\underline{1}}$$

2 0) $\{x_n\} \to x$, $\{y_n\} \to y$, $\{x_n + y_n\} \to \{x_n\} + \{y_n\}$?

$$\lim_{n\to\infty} x_n + y_n = x + y$$

Finnes en N for $n \geq N$, slik at for $\varepsilon > 0$

$$(|x_n + y_n|) - (|x| + |y|) < \varepsilon$$

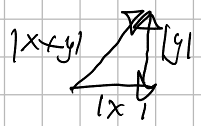
$$|x_n - x| + |y_n - y| < \varepsilon$$

$$|x_n - x| < \frac{\varepsilon}{2}, \quad |y_n - y| < \frac{\varepsilon}{2}$$

$$|x_n - x| + |y_n - y| < \frac{\varepsilon}{2} + \frac{\varepsilon}{2} = \varepsilon$$

Trekantulikhet

$|x+y| \le |x| + |y|$ $\{x_n\}$, $\{y_n\}$



Uralt 8

$\{x_n\} \to x$, $\{y_n\} \to y$, $\{x_n + y_n\} \to \{x_n\} + \{y_n\}$?

$|(x_n + y_n) - (x+y)| < \varepsilon$, $\varepsilon > 0$

$$|(x_n + y_n) - (x+y)| = |(x_n - x) + (y_n - y)| \le \underbrace{|x_n - x|}_{<\frac{\varepsilon}{2}} + \underbrace{|y_n - y|}_{<\frac{\varepsilon}{2}}$$

Bevis

siden $x_n \to x$ så vil for en N', der $n \ge N'$, $|x_n - x| < \frac{\varepsilon}{2}$

siden $y_n \to y$ så vil for en N'', der $n \ge N''$, $|y_n - y| < \frac{\varepsilon}{2}$

$N = \max(N', N'')$

$|(x_n + y_n) - (x+y)| \le \frac{\varepsilon}{2} + \frac{\varepsilon}{2} = \varepsilon$

$|(x_n + y_n) - (x+y)| < \varepsilon$ Kys $\square$

2 1) $\left\{\frac{2(n+1)}{n}\right\}_{n=1}^{\infty} \to 2$

$\lim_{n\to\infty} \frac{2(n+1)}{n} = 2$?

$$\lim_{n\to\infty} \frac{2(n+1)}{n} = \lim \frac{2n+2}{n} = \lim 2\frac{n}{n} + \frac{2}{n} = \lim_{n\to\infty} 2 + \frac{2}{n} = 2 + 0 = \underline{\underline{2}}$$

2 2) $\{x_n\} \to x$

for N, der $n \ge N$, så finnes en $\varepsilon > 0$ slik at

$|a x_n - a x| < \varepsilon$

$|a x_n - a x| = |a(x_n - x)|$

for N', der $n \ge N'$, så finnes en $\varepsilon > 0$ slik at

$|x_n - x| < \frac{1}{a}\varepsilon$

$N = N'$

$|a x_n - a x| = |a(x_n - x)| < |a(\frac{\varepsilon}{a})| < \varepsilon$

$|a x_n - a x| < \varepsilon$ ◯ Hang degsele

23) $\left\{ \frac{n+2}{2n} \right\}_{n=1}^{\infty} \to$?

$\lim_{n \to \infty} \frac{n+2}{2n} = \lim_{n \to \infty} \frac{n}{2n} + \frac{2}{2n} = \lim_{n \to \infty} \frac{1}{2} + \frac{1}{n} = \frac{1}{2} + 0 = \frac{1}{2}$