

Opl 1.

1 Hva er Taylorpolynomiet til $f(x) = x^2$ av grad 1.

$$f(a) = 1^2$$

$$f'(x) = 2x, \quad f(a) = 2$$

$$\boxed{A} \quad 1 + 2(x - 1)$$

2 Hva er Taylorpolynomiet til $f(x) = \ln(x)$ av grad 3

$$T_n f(a) = \sum_{k=0}^n \frac{(\ln x)^{(k)}}{k!} (x-a)^k$$

$$f(a) = \ln 1 = 0$$

$$f'(x) = \frac{1}{x} \Rightarrow f'(1) = \underline{1}$$

$$f''(x) = \left(\frac{1}{x}\right)' = -\frac{1}{x^2} \Rightarrow f''(1) = \underline{-1}$$

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

$$T_n f(x) = 0 + 1(x-1) + \frac{-1(x-1)^2}{2!} + \frac{2(x-1)^3}{3!}$$

$$\boxed{\frac{1}{6}} = (x-1) - \frac{1}{2}(x-1)^2 + \frac{1}{6}(x-1)^3$$

3. Find Taylorpoly n-ter ord 1 om $a=0$
 når $f(x) = \sin(\sin(x))$

$$f(0) = \sin(\sin(0)) = 0$$

$$f'(x) = \cos(\sin(x)) \cos(x)$$

$$f'(0) = \cos(\sin(0)) \cos(0) = 1$$

~~$$f''(x) = -\sin(\sin(x)) \cos(x) - \cos(\sin(x)) \sin(x)$$~~

$$T_n f(0) = 0 + \frac{1(x-0)^1}{1!}$$

$$= x \quad \boxed{\frac{1}{1!}}$$

4. Løs differensiel ligningen

$$y'' - 4y' + 4y = 0$$

$$y(0) = 1, \quad y'(0) = 1$$

