1)

$$T_{(8)} = f(a) + f'(a)(x-a) + \frac{1}{2!}f''(a)(x-a)^2 + \frac{1}{3!}f'''(a)(x-a)^3 + \frac{1}{4!}f''''(a)(x-a)^4 +$$

$$+ \frac{1}{5!}f'''''(a)(x-a)^5 + \frac{1}{6!}f''''''(a)(x-a)^6 + \frac{1}{7!}f'''''''(a)(x-a)^7 + \frac{1}{8!}f''''''''(a)(x-a)^8$$

$f(x) = \sin(x)$ $\quad a = 0$ $\quad f(0) = \sin(0) = 0$

$f'(x) = \cos(x)$ $\quad f'''''(x) = \cos(x)$ $\quad f'(0) = \cos(0) = 1$

$f''(x) = -\sin(x)$ $\quad f''(0) = -\sin(0) = 0$

$f'''(x) = -\cos(x)$ $\quad f'''(0) = -\cos(0) = -1$

$f''''(x) = \sin(x)$ $\quad f''''(0) = \sin(0) = 0$

$\vdots$

Po dosazení 0 za a a hodnot derivací

$$T_8 = 0 + 1 \cdot x + \frac{1}{2!} \cdot 0 \cdot x^2 + \frac{1}{3!} \cdot (-1) \cdot x^3 + \frac{1}{4!} \cdot 0 \cdot x^4 +$$

$$+ \frac{1}{5!} \cdot 1 \cdot x^5 + \frac{1}{6!} \cdot 0 \cdot x^6 + \frac{1}{7!} \cdot (-1) \cdot x^7 + \frac{1}{8!} \cdot 0 \cdot x^8 =$$

$$= x - \frac{1}{3!}x^3 + \frac{1}{5!}x^5 - \frac{1}{7!}x^7$$

$f(x) = \cos(x)$ $\quad a = 0$

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

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

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

$\vdots$

$f(0) = 1$

$f'(0) = 0$

$f''(0) = -1$

$f''''(0) = 0$

$$T_8 = 1 + \frac{1}{1!} \cdot 0 \cdot x + \frac{1}{2!} \cdot (-1) \cdot x^2 + \frac{1}{3!} \cdot 0 \cdot x^3 + \frac{1}{4!} \cdot 1 \cdot x^4 +$$

$$+ \frac{1}{5!} \cdot 0 \cdot x^5 + \frac{1}{6!} \cdot (-1) \cdot x^6 + \frac{1}{7!} \cdot 0 \cdot x^7 + \frac{1}{8!} \cdot 1 \cdot x^8 =$$

$$= 1 - \frac{1}{2!}x^2 + \frac{1}{4!}x^4 - \frac{1}{6!}x^6 + \frac{1}{8!}x^8$$

$f(x) = e^x \qquad a = 0$

$f'(x) = e^x$

$\vdots$

$f(0) = e^0 = 1$

$\vdots$

$$T_8 = 1 + x + \frac{1}{2!}x^2 + \frac{1}{3!}x^3 + \frac{1}{4!}x^4 + \frac{1}{5!}x^5 + \frac{1}{6!}x^6 + \frac{1}{7!}x^7 + \frac{1}{8!}x^8$$

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

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

$f''(x) = (x^{-1})' = -x^{-2} \qquad f''(1) = -1$

$f'''(x) = 2x^{-3} \qquad f'''(1) = 2$

$f''''(x) = -6x^{-4} \qquad f''''(1) = -6$

$f'''''(x) = 24x^5$

$\vdots \qquad \vdots$

Pokračuje se jako n! s tím, že se střídá znaménko

$$T_6 = 0 + 1\cdot(x-1) + \frac{1}{2!}\cdot(-1)\cdot(x-1)^2 + \frac{1}{3!}\cdot(2!)\cdot(x-1)^3 + \frac{1}{4!}\cdot(-3!)(x-1)^4 + \frac{1}{5!}\cdot(4!)\cdot(x-1)^5 + \frac{1}{6!}(-5!)(x-1)^6 =$$

$$= (x-1) - \frac{1}{2}(x-1)^2 + \frac{1}{3}(x-1)^3 - \frac{1}{4}(x-1)^4 + \frac{1}{5}(x-1)^5 - \frac{1}{6}(x-1)^6$$