3d

$$\|f - P_3\|_\infty = \max_{0 \le x \le 3} |f(x) - P_3(x)|$$

$$\dots |f(x) - P_3(x)| = \left| \frac{f^{(4)}(\xi_x)}{4!} (x - x_0)(x - x_1)(x - x_2)(x - x_3) \right|$$

$$\le \frac{M}{4!} |(x - x_0)(x - x_1)(x - x_2)(x - x_3)|$$

$x_0 = 0,\ x_1 = 1,\ x_2 = 2,\ x_3 = 3$

$$= \frac{M}{4!} |(x^2 - x)(x^2 - 5x + 6)|$$

$$= \frac{M}{4!} |x^4 - 5x^3 + 6x^2 - x^3 + \dots$$

$$\dots + 5x^2 - 6x|$$

$$= \frac{M}{4!} |x^4 - 6x^3 + 11x^2 - 6x|$$