1) $f(x) = 2x^2 - 4x + 2$

→ $f'(x) = 4x - 4$ → $4x - 4 = 0$ → $x_E = 1$

→ $f''(x) = 4$ → $f''(1) = 4 > 0$ → Minimum $f(1) = 0$ → $T(1;\ 0)$

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

→ $f'(x) = -\frac{4}{3}x + \frac{1}{2}$ → $-\frac{4}{3}x + \frac{1}{2} = 0$ → $x_E = \frac{3}{8} = 0{,}375$

→ $f''(x) = -\frac{4}{3} < 0$ → Maximum $f\left(\frac{3}{8}\right) = \frac{25}{32} = -0{,}2396$ → $H(0{,}375;\ -0{,}2396)$

3) $f(x) = 3x^3 - 6x^2 + 4x - 5$

→ $f'(x) = 9x^2 - 12x + 4$ → $9x^2 - 12x + 4 = 0$ → $x_E = \frac{2}{3} \approx 0{,}667$

→ $f''(x) = 18x - 12$ → $f''(\frac{2}{3}) = 0$ → kein Extrempunkt

4) $f(x) = -x^3 + 4x^2 + 4x + 4$

→ $f'(x) = -3x^2 + 8x + 4$ → $-3x^2 + 8x + 4 = 0$ → $x_{E1} \approx -0{,}4305$ $x_{E2} \approx 3{,}0972$

→ $f''(x) = -6x + 8$

→ $f''(-0{,}4305) \approx 10{,}6 > 0$ → Minimum $f(-0{,}4305) \approx 3{,}1$ → $T(-0{,}43;\ 3{,}1)$

→ $f''(3{,}0972) \approx -10{,}6 < 0$ → Maximum $f(3{,}0972) \approx 25{,}05$ → $H(3{,}0972;\ 25{,}05)$

5) $f(x) = x^4 - 2x^3 + x^2 - 2x + 1$

→ $f'(x) = 4x^3 - 6x^2 + 2x - 2$ → $4x^3 - 6x^2 + 2x - 2 = 0$ → $x_E \approx 1{,}398$

→ $f''(x) = 12x^2 - 12x + 2$ → $f''(1{,}398) \approx 8{,}7 > 0$ → Minimum $f(1{,}398) \approx -1{,}4864$ → $T(1{,}398;\ -1{,}486)$

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

→ $f'(x) = -\frac{4}{3}x^3 + \frac{3}{2}x^2 + 3x - \frac{2}{3}$ → $-\frac{4}{3}x^3 + \frac{3}{2}x^2 + 3x - \frac{2}{3} = 0$ → $x_{E1} \approx -1{,}168$ $x_{E2} \approx 0{,}205$ $x_{E3} \approx 2{,}088$

→ $f''(x) = -4x^2 + 3x + 3$

→ $f''(-1{,}168) \approx -5{,}96 < 0$ → Maximum $f(-1{,}168) \approx 2{,}741$ → $H(-1{,}168;\ 2{,}741)$

→ $f''(0{,}205) \approx 3{,}45 > 0$ → Minimum $f(0{,}205) \approx 1{,}2634$ → $T(0{,}205;\ 1{,}263)$

→ $f''(2{,}088) \approx -8{,}17 < 0$ → Maximum $f(2{,}088) \approx 4{,}6967$ → $H(2{,}088;\ 4{,}6967)$