20. (774)

$m = \tan 45 = 1 = f'(x)$

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

$3x^2 = 3 \rightarrow x = \pm 1$

$f(x) = \int (3x^2 - 2)\,dx = x^3 - 2x + c$

(-1,5) ! (1,3) וגם (-1,3) ! (1,5) יש שתי אפשרויות

$f(1) = 3 = 1^3 - 2\cdot 1 + c \rightarrow c = 4$

$f(-1) = 5 = (-1)^3 - 2(-1) + c \rightarrow c = 4$

$f(1) = 5 = 1^3 - 2\cdot 1 + c \rightarrow c = 6$

$f(-1) = 3 = (-1)^3 - 2(-1) + c \rightarrow c = 2$

(נדחה) אין פתרון משותף

$\boxed{f(x) = x^3 - 2x + 4}$

22. (774)

$y''' = 12 \quad y'' = 12x + c \quad y' = 6x^2 + cx + b \quad y = 2x^3 + \frac{cx^2}{2} + bx + a$

$y'(-1) = 0 = 6 - c + b$

$y'(2) = 0 = 24 + 2c + b$

$\Big\} \; c = -6 \;,\; b = -12$

$y''(-1) = -12 - 6 = -18 < 0$ לכן $(-1, 0)$ הם מקסימום

$y(-1) = 0 = 2(-1)^3 - \frac{6(-1)^2}{2} + 12(-1) + a$

$0 = -2 - 3 + 12 + a \quad \boxed{a = -7}$

$\boxed{f(x) = 2x^3 - 3x^2 - 12x - 7}$

24. (774)

$f''(x) = 0 = 12x^2 - 12x - 24 \rightarrow x = 2 \;,\; x = -1$

(2,-24) ! (-1,9) אפשרות א'

$f'(x) = 4x^3 - 6x^2 - 24x + c$

$f(x) = x^4 - 2x^3 - 12x^2 + cx + b \rightarrow$

$f(-1) = 9 = 1 + 2 - 12 - c + b$

$f(2) = -24 = 16 - 16 - 48 + 2c + b$

$\Big\} \; c = 2 \;,\; b = 20$

$\boxed{f(x) = x^4 - 2x^3 - 12x^2 + 2x + 20}$

(2,9) ! (-1,-24) אפשרות ב'

$f(-1) = -24 = 1 + 2 - 12 - c + b$

$f(2) = 9 = 16 - 16 - 48 + 2c + b$

$\Big\} \; c = 24 \;,\; b = 9$

$\boxed{f(x) = x^4 - 2x^3 - 12x^2 + 24x + 9}$