

Sol: Given the

x	3	7	9	10
y	168	120	72	63

; To find the value of 6.

Using Lagrange's interpolation formula

$$f(x) = \frac{(x-x_1)(x-x_2)(x-x_3)}{(x_0-x_1)(x_0-x_2)(x_0-x_3)} y_0 + \frac{(x-x_0)(x-x_2)(x-x_3)}{(x_1-x_0)(x_1-x_2)(x_1-x_3)} y_1$$

$$+ \frac{(x-x_0)(x-x_1)(x-x_3)}{(x_2-x_0)(x_2-x_1)(x_2-x_3)} y_2 + \frac{(x-x_0)(x-x_1)(x-x_2)}{(x_3-x_0)(x_3-x_1)(x_3-x_2)} y_3$$

$$f(6) = \frac{(6-7)(6-9)(6-10)}{(3-7)(3-9)(3-10)} (168) + \frac{(6-3)(6-9)(6-10)}{(7-3)(7-9)(7-10)} (120)$$

$$+ \frac{(6-3)(6-7)(6-10)}{(9-3)(9-7)(9-10)} (72) + \frac{(6-3)(6-7)(6-9)}{(10-3)(10-7)(10-9)} (63)$$

$$= \frac{(-1)(-3)(-4)}{(-4)(-6)(-7)} (168) + \frac{(3)(-3)(-4)}{(4)(-2)(-3)} (120)$$

$$+ \frac{(3)(-1)(-4)}{(6)(2)(-1)} (72) + \frac{(3)(-1)(-3)}{(7)(3)(1)} (63)$$

$$= 12 + 180 - 72 + 27$$

$$f(6) = 147$$

5(d) → A majority function is a digit circuit whose output is 1 iff the majority of the inputs are 1. The output is 0 otherwise. Obtain the truth table of a three-input majority function. Can be obtained with 4 NAND gates.

Soln: Let A, B, C be three inputs. The design of this circuit can be done in the following steps.

→ Prepare a truth table. The output Y is 1 whenever two (or) more inputs are 1. otherwise output is 0.