Answer on Question #42258 – Math - Linear Algebra

The roots of the following equation are 5.8210, 1.6872 and -5090. Using Muller method approximates the root 5.8210 upto four decimal places.

$$f(x) = x^3 - 7x^2 + 6x + 5$$

Solution. There is the mistake in the problem statement. The third root should be –0.5090, instead of –5090. Let $x_1 = 5$, $x_2 = 6$, $x_3 = 5.8210$. Easy to obtain that

$$f(x_1) = -15,\ f(x_2) = 5,\ f(x_3) = -0.023284339,$$

$$f[x_3, x_2] = \frac{f(x_3)-f(x_2)}{x_3-x_2} = 28.063041,\ f[x_3, x_1] = \frac{f(x_3)-f(x_1)}{x_3-x_1} = 18.242041,$$

$$p_2 = f[x_3, x_2, x_1] = \frac{f[x_3, x_2] - f[x_3, x_1]}{x_2 - x_1} = 9.821,$$

$$2p_1 = f[x_3, x_2] + f[x_3, x_2, x_1](x_3 - x_2) = 26.305082.$$

By Muller method approximation parabola

$$p(x) = f(x_3) + 2p_1(x - x_3) + p_2(x - x_3)^2$$
$$= -0.023284339 + 26.305082(x - x_3) + 9.821(x - x_3)^2$$

and

$$x_4 = 5.821884873.$$

Hence, the solution $x^* \approx 5.8218$.

Answer. $x^* \approx 5.8218$.