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Section: 5B

$$f(x) = x^2 - 81$$

$$a_1 = 5$$

$$b_1 = 50$$

$$\begin{aligned}f(a) &= 5^2 - 81 \\&= 25 - 81 \\&= -56\end{aligned}$$

$$\begin{aligned}f(b) &= 50^2 - 81 \\&= 2419\end{aligned}$$

$$P_1 = \frac{a_1 + b_1}{2} = \frac{5 + 50}{2} = 27.5$$

$$F(P_1) = (27.5)^2 - 81$$

$$= 675.25 > 0$$

$$a_2 = 5$$

$$b_2 = P_1 = 27.5$$

$$b_2 = P_1 = 27.5$$

$$\begin{aligned}P_2 &= \frac{a_2 + b_2}{2} = \frac{5 + 27.5}{2} \\&= 16.25\end{aligned}$$

$$\begin{aligned}F(P_2) &= (16.25)^2 - 81 \\&= 183.0625 > 0\end{aligned}$$

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$$a_3 = 5$$

$$b_3 = P_2 = 16.25$$

$$P_3 = \frac{a_3 + b_3}{2}$$

$$= \frac{5 + 16.25}{2}$$

$$P_3 = 10.625$$

$$f(P_3) = (10.625)^2 - 81$$

$$= 31.890 > 0$$

$$a_4 = 5$$

$$b_4 = P_3 = 10.625$$

$$P_4 = \frac{a_4 + b_4}{2}$$

$$= \frac{5 + 10.625}{2}$$

$$P_4 = 7.8125$$

$$f(P_4) = (7.8125)^2 - 81$$

$$= -19.964 < 0$$

$$a_5 = P_4 = 7.8125$$

$$b_5 = 10.625$$

$$P_5 = \frac{a_5 + b_5}{2} = \frac{7.8125 + 10.625}{2} =$$

$$P_5 = 9.21875$$

$$f(P_5) = (9.21875)^2 - 81 \\ = 3.9853 > 0$$

$$a_6 = 7.8125$$

$$b_6 = P_5 = 9.21875$$

$$\bar{P}_6 = \frac{a_6 + b_6}{2}$$

$$= \frac{7.8125 + 9.21875}{2} \\ = 8.5156$$

$$f(\bar{P}_6) = (8.5156)^2 - 81$$

$$= -8.48 < 0$$

$$a_7 = \bar{P}_6 = 8.5156$$

$$b_7 = 9.21875$$

$$\bar{P}_7 = \frac{a_7 + b_7}{2} = \frac{8.5156 + 9.21875}{2}$$

$$\bar{P}_7 = 8.8671'$$

$$f(\bar{P}_7) = (8.8671)^2 - 81 \\ = -2.377 < 0$$

$$a_8 = P_7 = \frac{8.867}{2} 8.867$$

$$b_8 = 9.218 - 9.218$$

$$P_8 = \frac{8.867 + 9.218}{2}$$

$$P_8 = 9.042$$

$$f(P_8) = (9.042)^2 - 81 \\ = 0.758 > 0$$

$$a_9 = P_8 = 8.867$$

$$b_9 = P_8 = 9.042$$

$$P_9 = \frac{8.867 + 9.042}{2}$$

$$= 8.954$$

$$f(P_9) = (8.954)^2 - 81$$

$$= -0.82 < 0$$

$$a_{10} = P_9 = 8.954$$

$$b_{10} = 9.042$$

$$P_{10} = \frac{8.954 + 9.042}{2} = 8.998$$

$$F(P_{10}) = (8.998)^2 - 81$$

$$= 0.036 < 0$$

$$a_{11} = P_{10} = \cancel{0.036} \quad 8.954 \quad 8.998$$
$$b_{11} = 9.042$$

$$\cancel{P_{11}} = \frac{8.954 + 9.042}{2}$$
$$= 8.998$$

$$P_{11} = \frac{8.998 + 9.042}{2}$$

$$P_{11} = 9.02$$

$$F(P_{11}) = (9.02)^2 - 81$$
$$= 0.360 > 0$$

$$a_{12} = 8.998$$

$$b_{12} = P_{11} = 9.020$$

$$\hat{P}_{12} = \frac{8.998 + 9.020}{2}$$

$$P_{12} = 9.009$$

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$$F(P_{12}) = (9.009)^2 - 81$$

$$= 0.16 > 0$$

$$a_{13} = 8.998$$

$$b_{13} = P_{12} = 9.009$$

$$P_{13} = \frac{8.998 + 9.009}{2}$$

$$= 9.003$$

$$F(P_{13}) = (9.003)^2 - 81$$

$$= 0.054 > 0$$

$$a_{14} = 8.998$$

$$b_{14} = P_{13} = 9.003$$

$$P_{14} = \frac{8.998 + 9.003}{2}$$

$$= 9.000$$

$$F(P_{14}) = (9.000)^2 - 81$$

$$= 0$$

i_n	a_n	b_n	P_n
1	5	50	27.500
2	5	27.5	16.250
3	5	16.25	10.625
4.	5	10.625	7.8125
5.	7.8125	10.625	9.218
6.	7.812	9.218	8.515
7.	8.515	9.218	8.867
8.	8.867	9.218	9.042
9.	8.867	9.042	8.954
10.	8.954	9.042	8.998
11.	8.998	9.042	9.020
12.	8.998	9.020	9.009
13.	8.998	9.009	9.003
14.	8.998	9.003	9.000