

# Mandelbrot Set

$$z_0 = 0 + 0i$$

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$$z_1 = a + bi = C$$

$$C = z_1 = 2 + 3i$$

$$z_2 = (z_1)^2 + C$$

$$\begin{aligned} z_2 &= (2+3i)^2 + (2+3i) \\ &= (2+3i)(2+3i) + (2+3i) \\ &= 4 + \underbrace{6i+6i}_{12i} + 9i^2 + 2+3i \\ &= 4 + 12i - 9 + 2 + 3i \\ &= -3 + 15i \end{aligned}$$

$$z_3 = (z_2)^2 + C$$

$$\begin{aligned} z_3 &= (-3+15i)^2 + (2+3i) \\ &= -214 - 87i \end{aligned}$$

$$z_4 = (z_3)^2 + C$$

$$\begin{aligned} z_4 &= (-214-87i)^2 + (2+3i) \\ &= 38,229 + 37,239i \end{aligned}$$

$$z_5 = (z_4)^2 + C$$

$$\begin{aligned} z_5 &= (38,229 + 37,239i)^2 + (2+3i) \\ &= 74713322 + 2847219465i \end{aligned}$$

↑  
Diverging to  $\infty$