Assignment

$\frac{dy}{dt} = ky$

$\frac{dy}{y} = k\,dt$

$\int \frac{dy}{y} = \int k\,dt$

$\ln y = kt + c$

$y = e^{kt+c}$ ✓

$y = e^{kt} \times e^{c}$

$y_0 = e^{c}$

$\therefore y = y_0 e^{kt}$ for case A

The initial number of bacteria at $t = 0$ is 5

$\therefore 50 = y_0 e^{k(0)}$

$50 = y_0 \cdot 1$

$\therefore y_0 = 50$

$\therefore y = 50e^{kt}$

The numb of bacteria at $t = 9$hrs is 50ns

$y = 150$

$\therefore y = 50e^{k(9)}$

$150 = 50e^{9k}$

$e^{9k} = \frac{150}{50}$

$e^{9k} = 3$

$9k = \ln 3$

$9k = 1.0986$

$k = \frac{1.0986}{9}$

$k = 0.122$

$\therefore y = 50e^{0.122(t)}$ ∴

i.e $y_t = 50e^{0.122(t)}$

for case A

$y(t) = 50e^{0.122(t)}$

for case B

$g = g_0 e^{kt}$

The initial number at $t = 0$ is 150

$\therefore 150 = g_0 e^{k(0)}$

$150 = g_0 \cdot 1$

$\therefore g_0 = 150$

$\therefore$ The number of bacteria at $t = 9$hrs is

$150 \times 3 = 450$

$\therefore 450 = 150e^{k(9)}$

$e^{9k} = \frac{450}{150}$

$e^{9k} = 3$

$9k = \ln 3$

$9k = 1.0986$

$k = \frac{1.0986}{9}$

$k = 0.122$

$\therefore g = 150e^{0.122(t)}$

$\therefore$ for case B

$g(t) = 150e^{0.122(t)}$