① $f(x) = \left(\frac{1}{3}\right)^x$

$f(2) = \left(\frac{1}{3}\right)^2 = \frac{1}{9} = 0,11$

② $f(x) = 2^{2x}$

$f(-1) = 2^{2(-1)} = 2^{-2} = \frac{1}{2^2} = \frac{1}{4} = 0.25$

③ $g(x) = e^{-x}$

$g(1) = e^{-1} = \frac{1}{e} = 0.37$

④ Diketahui : $X \rightarrow 2X$ dalam $t = 1$ jam

maka $X(t) = 2^t$

Saat ~~t(0) t = 10.00~~, $X(0) = 2^0 = 1$

$t = 0 = 10.00$

Saat pukul 14.00: $t = 14.00 - 10.00$

$t = 4$ jam

Maka ~~X(4)~~ jumlah bakteri $X = X(4) = 2^4 = 16$ bakteri //

⑤ $f(x) = \frac{1}{1 + e^{-x}}$

$f(1) = \frac{1}{1+e^{-1}} = \frac{1}{1+\frac{1}{e}} = \frac{1}{1+0,37} = \frac{1}{1.37} = 0.73$

⑥ ${}^3\log 81 = {}^3\log 3^4 = 4.\,{}^3\log 3 = 4.1 = 4$

⑦ ${}^2\log 1024 = {}^2\log 2^{10} = 10.\,{}^2\log 2 = 10.1 = 10$

⑧ ${}^4\log 16 + {}^4\log \frac{1}{4} = {}^4\log 4^2 + {}^4\log 4^{-1}$

$= 2.\,{}^4\log 4 + (-1).\,{}^4\log 4$

$= 2(1) - 1 = 1$

⑨ $f(x) = 4 - 3x - x^2$

Interval $[a,b] = [-1, 1]$

$n = 4$

$\Delta x = \frac{b-a}{n} = \frac{1-(-1)}{4} = \frac{1}{2}$

~~Luas area di bawah kurva $f(x)$: $\frac{\Delta x (f(x_0) + f(x_1))}{2}$ ≠~~

Menggunakan penjumlahan trapesium:

$$S(4) = \frac{\Delta x}{2}(f(x_0)+f(x_1)) + \frac{\Delta x}{2}(f(x_1)+f(x_2)) + \frac{\Delta x}{2}(f(x_2)+f(x_3)) + \frac{\Delta x}{2}(f(x_3)+f(x_4))$$

$$= \frac{\Delta x}{2}(f(x_0) + 2f(x_1) + 2f(x_2) + 2f(x_3) + f(x_4))$$

Luas area di bawah kurva $f(x)$ di interval $[-1,1]$ $= \frac{\Delta x}{2}(f(x_0) + 2f(x_1) + 2f(x_2) + 2f(x_3) + f(x_4))$

dimana,

$f(x_0) = f(-1) = 4 - (3)(-1) - (-1)^2 = 6$

$f(x_1) = f(-0.5) = 4 - (3)(-0.5) - (-0.5)^2 = 5.25$

$f(x_2) = f(0) = 4 - (3)(0) - 0^2 = 4$

$f(x_3) = f(0.5) = 4 - (3)(0.5) - (0.5)^2 = 2.25$

$f(x_4) = f(1) = 4 - 3(1) - 1^2 = 0$

$$= \frac{\Delta x}{2}(f(-1) + 2f(-0.5) + 2f(0) + 2f(0.5) + f(1))$$

$$= \frac{1/2}{2}(6 + 2(5.25) + 2(4) + 2(2.25) + 0)$$

$$= 7.25$$

⑩ $g(x) = (x-1)^3$

Interval $[a,b] = [1, 3]$

$n = 4$

$\Delta x = \frac{b-a}{n} = \frac{3-1}{4} = \frac{1}{2}$

Seperti soal ⑨, luas area di bawah kurva dengan penjumlahan trapesium:

$$S(4) = \frac{\Delta x}{2}(f(x_0) + 2f(x_1) + 2f(x_2) + 2f(x_3) + f(x_4))$$

dimana: $f(x) = g(x)$

$g(x_0) = g(1) = (1-1)^3 = 0$

$g(x_1) = g(1.5) = (1.5-1)^3 = 0.125$

$g(x_2) = g(2) = (2-1)^3 = 1$

$g(x_3) = g(2.5) = (2.5-1)^3 = 3.375$

$g(x_4) = g(3) = (3-1)^3 = 8$

Sehingga luas area:

$$S(4) = \frac{1}{2}(0 + 2(0.125) + 2(1) + 2(3.375) + 8)$$

$$= 4.25$$