(5) $y = x^2 + 3x - 2$, interval $[-3, 1]$

Cek nilai ujung: $y(-3) = (-3)^2 + 3(-3) - 2 = 9 - 9 - 2 = -2$

$y(1) = 1^2 + 3(1) - 2 = 1 + 3 - 2 = 2$

Cek titik stasioner: $y' = 0 \rightarrow y' = 2x + 3 = 0$ saat $x = -\frac{3}{2}$,

$2x = -3$

$x = -\frac{3}{2}$

$y = \left(-\frac{3}{2}\right)^2 + 3\left(-\frac{3}{2}\right) - 2$

$y = \frac{9}{4} + \left(-\frac{9}{2}\right) - 2$

$y = -\frac{17}{4}$

Titik maksimum: $y = 2$ saat $x = 1$

Titik minimum: $y = -\frac{17}{4}$ saat $x = -\frac{3}{2}$

(6) $y = ax + b$

Diketahui: kemiringan $= -2 = a$

Di titik $(1, 9) \rightarrow y = ax + b$

$9 = -2x + b$

$9 = -2(1) + b$

$9 = -2 + b$

$b = 11$ //

(7) Bakteri x membelah jadi $^1 2$ setiap 30 menit $= \frac{1}{2}$ jam

Pukul 10.00 $\rightarrow$ 1 bakteri x

Pukul 12.30 $\rightarrow \Delta t = 12.30 - 10.00 = 2\frac{1}{2}$ jam

jumlah bakteri x saat 12.30 $= 2^n = 2^{\left(\frac{5}{2} : \frac{1}{2}\right)} = 2^5 = 32$ bakteri x

(8) $y = \left(\frac{1}{2}\right)^{x+1}$

mis. $u = \frac{1}{2}$, $u' = 0$

$v = x + 1$, $v' = 1$

Selingga: $\frac{d}{dx}(u^v) = u^v\left(v' \ln u + \frac{v}{u} u'\right)$

$= u^v\left(\ln u + \frac{v}{u} \cdot 0\right)$

$= u^v \ln u$

$= \left(\frac{1}{2}\right)^{x+1} \ln \frac{1}{2}$

Saat $x = 1$:

$\frac{dy}{dx} = \left(\frac{1}{2}\right)^{1+1} \ln \frac{1}{2}$

$\frac{dy}{dx} = \frac{1}{2}^2 \cdot (\ln 1 - \ln 2$

$= \frac{1}{4} \cdot (0 - 0.693)$

$= -0.173$

⑨ $f(x) = 12x - x^2$, pada interval $[4,7]$

Cek titik ujung: $f(4) = 12(4) - (4)^2 = 48 - 16 = 32$

$f(7) = 12(7) - (7)^2 = 84 - 49 = 35$

Cek titik stasioner $f'(x) = 0 \rightarrow f'(x) = 12 - 2x = 0$

$2x = 12$

$x = 6$

$y(6) = 12(6) - 6^2$

$= 72 - 36$

$= 36$

Titik maksimum adalah $f(x) = 36$ di $x = 6$ //

⑩ $f(x) = x - \ln(x)$, $x_0 = 0.5$ Dengan Newton - Raphson

$f'(x) = 1 - \frac{1}{x}$

$f''(x) = \frac{1}{x^2}$

$x_1 = x_0 - \frac{f'(x_0)}{f''(x_0)} = 0.5 - \frac{(1 - \frac{1}{0.5})}{\frac{1}{0.5^2}} = 0.75$

$x_2 = x_1 - \frac{f'(x_1)}{f''(x_1)} = 0.75 - \frac{(1 - \frac{1}{0.75})}{1/0.75^2} = 0.9375$

$x_3 = x_2 - \frac{f'(x_2)}{f''(x_2)} = 0.9375 - \frac{(1 - \frac{1}{0.9375})}{1/0.9375^2} = 0.$

$x_4 = x_3 - \frac{f'(x_3)}{f''(x_3)} = 0.996 - \frac{(1 - \frac{1}{0.996})}{1/0.996^2} = 1.035$