

1. (1) $y' = 3x^2 - 6x$ $x=3$ のとき $y' = 27 - 18 = 9$

よて (接) $y - 1 = 9(x - 3)$
 $y = 9x - 26$

(法) $y - 1 = -\frac{1}{9}(x - 3)$
 $y = -\frac{1}{9}x + \frac{4}{3}$

(3) $y' = \frac{1}{2\sqrt{4-x^2}} \cdot (-2x) = -\frac{x}{\sqrt{4-x^2}}$

$x = -\sqrt{3}$ のとき $y' = \sqrt{3}$
 よて (接) $y - 1 = \sqrt{3}(x + \sqrt{3})$
 $y = \sqrt{3}x + 4$

(法) $y - 1 = -\frac{1}{\sqrt{3}}(x + \sqrt{3})$
 $y = -\frac{1}{\sqrt{3}}x$

2. (1) $y' = \frac{1}{2\sqrt{x}}$ 接点の x 座標を t とすると

(接) $y - \sqrt{t} = \frac{1}{2\sqrt{t}}(x - t)$

これが $(-2, 0)$ を通るので
 $-\sqrt{t} = \frac{1}{2\sqrt{t}}(-2 - t)$
 $2t = t + 2 \quad t = 2$

よて $y - \sqrt{2} = \frac{1}{2\sqrt{2}}(x - 2)$
 $y = \frac{\sqrt{2}}{4}x + \frac{\sqrt{2}}{2}$

(2) $y' = \frac{1}{x}$ 接点の x 座標を t とおくと

(接) $y - (\log t - 1) = \frac{1}{t}(x - t)$

これが $(0, 0)$ を通るので
 $-(\log t - 1) = +1 \quad t = e^2$

よて $y = \frac{1}{e^2}x$

(2) $y' = \frac{(1+x) - x}{(1+x)^2} = \frac{1}{(1+x)^2}$

$x = 0$ のとき $y' = 1$

よて (接) $y - 0 = 1 \cdot (x - 0)$
 $y = x$

(法) $y = -x$

(4) $y' = \frac{1}{x} \quad x = e$ のとき $y' = \frac{1}{e}$

よて (接) $y - 1 = \frac{1}{e}(x - e)$
 $y = \frac{1}{e}x$

(法) $y - 1 = -e(x - e)$
 $y = -ex + 1 + e^2$

3. 接点の x 座標を p とおくと

2 曲線は接するので $ap^3 = 3 \log p \dots ①$

傾きも等しいので $3ap^2 = \frac{3}{p} \dots ②$

①, ②より $1 = 3 \log p$
 $\log p = \frac{1}{3}$
 $p = e^{\frac{1}{3}}$

②に代入して $ae = 1 \quad a = \frac{1}{e}$

よて (接) $y - 1 = \frac{3}{\sqrt[3]{e}}(x - \sqrt[3]{e})$
 $y = \frac{3}{\sqrt[3]{e}}x - 2$