NAME : AYODEJI MOSOPE FOLUWA COMFORT
MATRIC NO: 19/MHS01/111
SCHOOL: 93
REGISTRATION: 19H372913HA

Find d

a) The equation of the tangent

b) The equation of the normal

1. $y = 2x^2$ at the point (1,2)

$dy/dx = 4x$

$\frac{dy}{dx}|_{x=1} = 4(1)$

$m = 4$

Equation of tangent $= y - y_1 = m(x - x_1)$

$= y - 2 = 4(x - 1)$

$= y - 2 = 4x - 4$

$= y - 2 - 4x + 4 = 0$

Equation of tangent $= y - 4x + 2 = 0$

$m_1 m_2 = -1$

$m_1 = 4$

$4m_2 = -1$

$m_2 = -1/4$

$y - y_1 = m(x - x_1)$

$y - 2 = -1/4 (x - 1)$ multiply through by 4

$4y - 8 = -x + 1$

$4y + x - 8 - 1 = 0$

$4y + x - 9 = 0$

$\therefore$ Equation of normal $= 4y + x - 9 = 0$

2) $y = 3x^2 - 2x$ at the point (2, 8)

$dy/dx = 6x - 2$

$\frac{dy}{dx}|_{x=2} = 6(2) - 2$

$m = 12 - 2$

$m = 10$

$y - y_1 = m(x - x_1)$

$y - 8 = 10(x - 2)$

$y - 8 = 10x - 20$

$y = 10x - 8 + 20 = 0$

$y - 10x + 12 = 0$ — Equation of tangent

$m_1 m_2 = -1$

$m_1 = 10$

$10 m_2 = -1$

$m_2 = -1/10$

$y - y_1 = m(x - x_1)$

$y - 8 = -1/10 (x - 2)$

$10y - 80 = -x + 2$

$10y + x - 80 - 2 = 0$

$10y + x - 82 = 0$ — Equation of normal

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NAME: AYODEJI MOSOPE ADEWUNMI

MATRIC NO: 19/MHS01/111

SERIAL NO: 93

REGISTRATION NO: 96HS7293HD

3 $y = \frac{x^3}{2}$ at the point $(-1, -1/2)$

$dy/dx = 3/2\, x^2$

$dy/dx \mid x = -1 = 3/2\,(-1)^2$

$m = 3/2$

$y - y_1 = m(x - x_1)$

$y - (-1/2) = m(x - (-1))$

$y + 1/2 = 3/2\,(x+1)$ Multiply x 2

$2y + 1 = 3(x+1)$

$2y + 1 = 3x + 3$

$2y - 3x + 1 - 3 = 0$

$2y - 3x - 2 = 0$ — Equation of tangent

$m_1 m_2 = -1$

$m_1 = 3/2$

$3/2\, m_2 = -1$

$m_2 = -1/3/2$

$m_2 = -2/3$

$y - y_1 = m(x - x_1)$

$y - (-1/2) = -2/3\,(x - (-1))$

$y + 1/2 = -2/3(x+1)$ multiply by 2

$2y + 1 = -4/3\,(x+1)$ multiply by 3

$by + 3 = -4(x+1)$

$by + 3 = -4x - 4$

$by + 4x + 7 = 0$ — Equation of normal

4) $y = 1 + x - x^2$ at the point $(-2, -$

$dy/dx = -2x + 1$

$dy/dx \mid x = -2 \quad -2(-2) + 1$

$m = 4 + 1$

$m = 5$

$y - y_1 = m(x - x_1)$

$y - (-5) = 5(x - (-2))$

$y + 5 = 5(x + 2)$

$y + 5 = 5x + 10$

$y - 5x + 5 - 10 = 0$

$y - 5x - 5 = 0$ — Equation of tangent

$m_1 m_2 = -1$

$m_1 = 5$

$m_2 = -1/5$

$y - y_1 = m(x - x_1)$

$y - (-5) = -1/5\,(x - (-2))$

$y + 5 = -1/5\,(x + 2)$ multiply by 5

$5y + 25 = -1(x + 2)$

$5y + 25 = -x - 2$

$5y + x + 25 + 2 = 0$

$5y + x + 27 = 0$ — Equation of normal

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NAME : HYODE JI MOSOPEFOLUWA COMFORT

MATRIC NO: 19/MHS01/111

SERIAL NO: 93

REGISTRATION NO: 96457293HD

3) $Y = 1/x$ at the point $(3, 1/3)$

$dy/dx = -1/x^2$

$dy/dx|_{x=3} = -1/(3)^2 = -1/9$

$y - y_1 = m(x - x_1)$

$y - 1/3 = -1/9(x - 3)$ multiply by 9

$9y - 3 = -1(x - 3)$

$9y - 3 = -x + 3$

$9y - x - 3 + 3 = 0$

$9y - x = 0$ — Equation of tangent

$m_1 m_2 = -1$

$m_1 = -1/9$

$-1/9 m_2 = -1$

$m_2 = -9$

$y - y_1 = m(x - x_1)$

$y - 1/3 = -9(x - 3)$ multiply by 3

$3y - 1 = -27(x - 3)$

$3y - 1 = -27x + 81$

$3y + 27x - 1 + 81 = 0$

$3y + 27x + 80 = 0$ — Equation of normal

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