A. $y = \sin x + \cos(2x)$	E. $y = e^{x^2} + 4x - \frac{1}{\sqrt[3]{x}}$
B. $y = \frac{4^x}{4x-1}$	F. $g(x) = \frac{3}{\sec(2x)}$
C. $x - y^2 = 4x^3 - 1$	G. $h(x) = x^2 \sec(x)$
D. $f(x) = 3\ln(x^2+2)$	H. $y = 4\sqrt{\cot(\sin 3x)}$

Rewrite: $y = 4(\cot(\sin 3x))^{1/2}$

1. Find the slope of H in terms of x

$H'(x) = y' = 4 \cdot \frac{1}{2}(\cot(\sin 3x))^{-1/2} \cdot -\csc^2(\sin 3x) \cdot \cos 3x \cdot 3$

2. Find the instantaneous slope of B at $x = 0$

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

$$y'(0) = \frac{(-1)(\ln 4) - (4)}{(-1)^2} = \boxed{-\ln 4 - 4}$$

3. Find $\frac{d^2x}{dy^2}$ of A

$\frac{dy}{dx} = y' = \cos x - \sin 2x \cdot 2 = \cos x - 2\sin 2x$

$\frac{d^2y}{dx^2} = y'' = -\sin x - 2\cos 2x \cdot 2 = -\sin x - 4\cos 2x$

4. Find the equation of the tangent line of D at $x=1$

point: $\boxed{(1, \ln 27)}$ slope: $y' = 3 \cdot \frac{1}{x^2+2} \cdot 2x$

$y'(1) = 3 \cdot \frac{1}{1+2} \cdot 2(1) = \boxed{2}$

$y - \ln 27 = 2(x-1)$

5. Find the equation of the normal line of D at $x=1$

point: $\boxed{(1, \ln 27)}$ slope: $\boxed{\frac{-1}{2}}$

$y - \ln 27 = -\frac{1}{2}(x-1)$

6. Find $\left.\frac{dy}{dx}\right|_{(0,1)}$ for C.

$1 - 2y\frac{dy}{dx} = 12x^2$

$-2y\frac{dy}{dx} = 12x^2 - 1$

$\frac{dy}{dx} = \frac{12x^2-1}{-2y}$

$\left.\frac{dy}{dx}\right|_{(0,1)} = \frac{12(0)^2-1}{-2(1)} = \frac{-1}{-2} = \frac{1}{2}$

7. Find equation of the normal line for C at (0,1)

point: $\boxed{(0,1)}$

slope: $\boxed{-2}$

$y - 1 = -2(x-0)$

8. Find $F'(x)$

$F'(x) = y' = \frac{(\sec 2x)(0) - (3)(\sec 2x \tan 2x \cdot 2)}{(\sec 2x)^2}$

$y' = \frac{6 \sec 2x \tan 2x}{\sec^2(2x)}$

9. Find equation of normal line for G at (π, π^2)

point: $\boxed{(\pi, \pi^2)}$

slope: $y' = (\sec x)(2x) + (x^2)(\sec x \tan x)$

$y'(\pi) = (\sec \pi)(2\pi) + (\pi^2)(\sec \pi \tan \pi)$

$= (-1)(2\pi) + (\pi^2)(-1 \cdot 0)$

$= -2\pi$ ← tangent $\} = \boxed{\frac{1}{2\pi}}$ ← normal

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

10. Find equation of tangent line for E at $x = 1$

point: $\boxed{(1, e+3)}$

slope: $y' = e^{x^2} \cdot 2x + 4 + \frac{1}{3}x^{-2/3}$

$y'(1) = e \cdot 2 + 4 + \frac{1}{3}$

$= \boxed{2e + \frac{13}{3}}$

$y - (e+3) = \left(2e + \frac{13}{3}\right)(x-1)$