Problem 1. Find dy/dx.

1. * $y = \cos(x^2)$.
2. $y = \left(x + \dfrac{1}{x}\right)^5$.
3. $y = \sqrt{\dfrac{x}{x+1}}$.
4. $y = \sqrt{\dfrac{1+\sin x}{1+\cos x}}$.
5. $y = \cot^2(\sin x)$.
6. * $y = \tan^2(4x)$.
7. $y\cos x = x^2 + y^2$.
8. $x\sin y + y\sin x = 1$.
9. $xy = \sqrt{x^2+y^2}$.
10. $\tan(x/y) = x + y$.

Problem 2. Find the equation of tangent and normal lines to the given curve at the given point.

1. $\sin(x+y) = 2x - 2y$ at (π, π).
2. * $x^2 - xy - y^2 = 1$ at $(2, 1)$ (hyperbola).
3. * $x^2 + 2xy + 4y^2 = 12$ at $(2, 1)$ (ellipse).
4. $x^2 + y^2 = (2x^2 + 2y^2 - x)^2$ at $(0, 1/2)$ (cardioid).
5. $x^{2/3} + y^{2/3} = 4$ at $(-3\sqrt{3}, 1)$ (astroid).
6. $y^2(y^2 - 4) = x^2(x^2 - 5)$ at $(0, -2)$ (devil's curve).

Problem 3. Find d^2y/dx^2.

1. $x^2 + xy + y^2 = 3$.
2. $x^3 - y^3 = 7$.