1)

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

$y' = 2x$

$y'(2) = 4$

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

Normal: $y - 1 = -\frac{1}{4}(x-2)$

2)

$f(x) = \sqrt{x} \quad (4,2)$

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

$f'(4) = \frac{1}{4}$

Tangent: $y - 2 = \frac{1}{4}(x-4)$

Normal: $y - 2 = -4(x-4)$

3)

$y = 2 - 4x^{-2} \quad (2,1)$

$y' = 8x^{-3} = \frac{8}{x^3}$

$y'\big|_{x=2} = 1$

Tangent: $y - 1 = 1(x-2)$

Normal: $y - 1 = -1(x-2)$

4)

$y = 4x^2 + 8x + 1 \; ; \quad x = 1$

point	slope
$y(1) = 13$	$y' = 8x + 8$
	$y'(1) = 16$

Tangent: $y - 16 = 13(x-1)$

5)

$y = 3x^2 - x^3$

point	slope
$Y(2) = 20$	$y' = 6x - 3x^2$
	$y'(-2) = -24$

Normal: $y - 20 = \frac{1}{24}(x+2)$

6)

$y = 2x^3 + 3x^2 - 12x + 1$

$y' = 6x^2 + 6x - 12 = 0$

$x^2 + x - 2 = 0$

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

$x = -2 \quad\quad x = 1$

$(-2, 21) \quad (1, -6)$

7)

$g(x) = x^3 - 17x^2 + 63x$

$g'(x) = 3x^2 - 34x + 63 = 0$

$(3x-7)(x-9) = 0$

$x = \frac{7}{3} \quad\quad x = 9$

8)

$f(x) = 8x^2 - 7x$

$f'(x) = 16x - 7 = -87$

$16x = -80$

$x = -5$

$f(-5) = 8(-5)^2 - 7(-5)$

$= 200 + 35$

$= 235$

$(-5, 235)$

9)

$y = x^{3/2} \quad\quad\quad y = 1 + 3x$

$\quad\quad\quad\quad\quad\quad\quad\quad m = 3$

$y' = \frac{3}{2}x^{1/2}$

point	slope
$\frac{3}{2}x^{1/2} = 3$	$y'(4) = 3$
$x^{1/2} = 2$	
$x = 4$	Tangent: $y - 8 = 3(x-4)$

$y(4) = 8$

$(4, 8)$

10)

$y = ax^2 + bx + c \quad \rightarrow \quad y' = 2ax + b$

$y'(1) = 4$	$y'(-1) = -8$	$y(2) = 15$
$2a + b = 4$	$-2a + b = -8$	$4a + 2b + c = 15$
$b = 4 - 2a$	$-2a + 4 - 2a = -8$	
	$-4a = -12$	
$b = -2$	$a = 3$	$12 - 4 + c = 15$
		$c = 7$

$\boxed{y = 3x^2 - 2x + 7}$

11)

$3x^2 - 2$