Differentiation, No Chain Rule

(1) Evaluate the following limits.

$$\lim_{x\to 3} = \frac{\sqrt{x^2+7}+\sqrt{3x-5}}{x+2} \tag{1}$$

$$\lim_{x\to -1} \frac{x^2-x-2}{2x^2-x-3} \tag{2}$$

$$\lim_{x\to 2} 3$$

$$\lim_{x\to \infty} \frac{3x+2}{x-5}$$

$$\lim_{x\to \infty} \frac{x^5-x^3+x-1}{x^6+2x^2+1}$$

$$\lim_{x\to 9} \frac{\sqrt{x}-3}{x-9} \tag{3}$$

$$\lim_{x\to \infty} \frac{\sqrt{x^2-8x}}{2x+1} \tag{4}$$

$$\lim_{x\to -1} \frac{x^2-x-2}{2x^2-x-3}$$

$$\lim_{x\to \infty} \frac{2+\frac{1}{x+4}}{3-\frac{1}{x^2}}$$

$$\lim_{x\to \infty} \frac{x-2x^3}{(1+x)^3}$$

$$\lim_{x\to \infty} \frac{\sqrt{4x^2+3}}{x+5}$$

(2) Find the equation of the tangent line at P for the function f.

$$f(x) = \frac{x}{2x+3}, P = \left(1, \frac{1}{5}\right) \tag{5}$$

$$f(x) = 2x^3(3x^4+x), P = (-2, -736)$$

$$f(x) = (3x+2)(2x-5), P = \left(\frac{1}{2}, -14\right)$$

$$f(x) = \sqrt{x}\ln x^3, P = (4, 12\ln 2) \tag{6}$$

(3) Find the derivatives for the following functions.

$$f(x) = 5x^{\frac{4}{3}} - \frac{2}{3}x^{\frac{3}{2}} + x^2 - 3x + 1$$

$$f(x) = 2t^2 + \sqrt{t^3}$$

$$f(x) = \frac{2}{x^2} - \frac{3}{x^{\frac{1}{3}}}$$

$$f(x) = \frac{3}{x^3} + \frac{4}{\sqrt{x}} + 1 \tag{7}$$

$$f(x) = (2x^2 - 1)(x^3 + 3)$$

$$g(t) = t^3\left(\sqrt{t} + 1\right)$$

$$f(z) = \frac{3z^2 + 5z - 2}{3z - 1}$$

$$h(x) = \frac{\sqrt{x}}{x^2 + 1}$$

$$f(x) = x^2 \ln x$$

$$g(y) = \ln y^{(5y-2)}$$

$$h(z) = (\ln z)^2 \tag{8}$$

$$f(x) = \log_2 x \tag{9}$$

$$f(x) = \frac{21 - 5x - 6x^2}{3 - 2x}$$

$$g(t) = (t^2 + 1)(\pi t - 6)$$

$$h(w) = \left(\frac{1}{\sqrt{x}} - x^3\right)\ln x^2 \tag{10}$$

$$f(x) = (2x + 1)\left(\sqrt[3]{x^2} + \frac{1}{x^3}\right)$$