(1) Find the limits if they exist.

(a) $\lim_{x\to 1} \dfrac{1}{x-1}$

(b) $\lim_{x\to 1} \dfrac{x^2+1}{x-1}$

(c) $\lim_{x\to 1} \dfrac{x^2-1}{x-1}$

(d) $\lim_{x\to 1} \dfrac{x^2-1}{x^2+4x-5}$

(e) $\lim_{x\to 0} \dfrac{\sin x}{x}$

(f) $\lim_{x\to -1} \dfrac{x^2+1}{x+1}$

(g) $\lim_{x\to 2} \dfrac{x^2+3x-10}{x^2-x-2}$

(h) $\lim_{x\to 2} \dfrac{\sqrt{x}-\sqrt{2}}{x-2}$

(i) $\lim_{x\to \infty} 7e^{-x}(x^5+31x+417)$

(2) Using the formulas, find the following derivatives:

(a) $f(x) = 5x^2 - x + 2$

(b) $g(x) = x + \dfrac{1}{x}$

(c) $k(x) = \sin x + 2\sqrt{x}$

(d) $f(t) = 2 + \frac{1}{2}t^5$

(e) $w = t^3 + 2t - 4$

(f) $u = 4e^s + \dfrac{1}{s^2}$

(3) Find the tangent line to the curve $y = x^2 + x + 1$ when $x_0 = 2$.

(4) Using the definition of the derivative at $x = c$, compute the following derivatives at an arbitrary point.
(a) $g(x) = 5x^2$

(b) $f(x) = 7x^4$.

(c) $k(x) = \sqrt{x}$.