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

(2) (2.3.19) $\lim_{x \to -4} \dfrac{\dfrac{1}{4} + \dfrac{1}{x}}{4 + x}$

(3) (2.3.38) In the theory of relativity, the Lorentz contraction formula

$$L = L_0\sqrt{1 - v^2/c^2}$$

expresses the length L of an object as a function of its velocity v with respect to an observer, where L_0 is the length of the object at rest and c is the speed of light. Find $\lim_{v \to c^-} L$ and interpret. Why are we evaluating the left-hand limit?

(4) (2.3.11) $\lim_{x \to 2} \dfrac{x^2 + x - 6}{x - 2}$

(5) (2.3.43) Is there a number a such that

$$\lim_{x \to -2} \frac{3x^2 + ax + a + 3}{x^2 + x - 2}$$

exists? If so, find the value of a and the value of the limit.

(6) (2.4.33) If $f(x) = x^3 - x^2 + x$, show that there is a number c such that $f(c) = 10$.

(7) (2.4.34) Prove there is a postive number c such that $c^2 = 2$.