1. Test

a)

$$\lim_{x \to 2} \frac{x^2 - x + 6}{x - 2}$$

b)

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

c)

$$\lim_{x \to 0} \frac{(4+x)^2 - 16}{x}$$
$$\lim_{x \to 0} \frac{8x + x^2}{x}$$
$$\lim_{x \to 0} 8 + x = 8 + 0 = 8$$

d)

$$\lim_{x \to 0} \frac{\sqrt{1+x} - 1}{x}$$
$$\lim_{x \to 0} \frac{(\sqrt{1+x} - 1)(\sqrt{1+x} + 1)}{x(\sqrt{1+x} + 1)}$$
$$\lim_{x \to 0} \frac{x}{x(\sqrt{1+x} + 1)}$$
$$\lim_{x \to 0} \frac{1}{\sqrt{1+x} + 1} = \frac{1}{\sqrt{1+0} + 1} = \frac{1}{2}$$

e)

$$\lim_{x \to 0} \frac{(1+x)^4 - 1}{x}$$
$$\lim_{x \to 0} \frac{((1+x)^2 + 1)((1+x)^2 - 1)}{x}$$
$$\lim_{x \to 0} \frac{((1+x)^2 + 1)(2+x)x}{x}$$
$$\lim_{x \to 0} ((1+x)^2 + 1)(2+x) = (1+0)^2 + 1)(2+0) = 4$$

f)

$$\lim_{x\to 2} \frac{x^4 - 16}{x - 2}$$
$$\lim_{x\to 2} \frac{(x^2 - 4)(x + 2)(x - 2)}{x - 2}$$
$$\lim_{x\to 2} (x^2 - 4)(x + 2) = 0$$

g)

$$\lim_{x\to 9} \frac{9 - x}{3 - \sqrt{x}}$$
$$\lim_{x\to 9} \frac{(9 - x)(3 + \sqrt{x})}{9 - x} = 3 + \sqrt{9} = 6$$

h)

$$\lim_{x\to 9} \frac{x^2 - 81}{\sqrt{x} - 3}$$
$$\lim_{x\to 9} \frac{(x + 9)(x - 9)(\sqrt{x} + 3)}{x - 9}$$
$$\lim_{x\to 9} (x + 9)(\sqrt{x} + 3) = 18 \times 6 = 72$$