

## Quiz #2

**Question** (10 points total)

- (a) Find  $\lim_{t \rightarrow 0} \frac{\sqrt{t^2+9}-3}{t^2}$ ;
- (b) Find  $\lim_{x \rightarrow 1} \frac{x^2-1}{x-1}$ ;
- (c) Find the points of discontinuity (if any) for:  $f(x) = \frac{4-x^2}{x^2+3x-4}$ .

**Solution:**

(a) Since

$$\frac{\sqrt{t^2+9}-3}{t^2} \cdot \frac{\sqrt{t^2+9}+3}{\sqrt{t^2+9}+3} = \frac{1}{\sqrt{t^2+9}+3}$$

we have

$$\lim_{t \rightarrow 0} \frac{\sqrt{t^2+9}-3}{t^2} = \lim_{t \rightarrow 0} \frac{1}{\sqrt{t^2+9}+3} = \frac{1}{6}.$$

(b) Since

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

we have

$$\lim_{x \rightarrow 1} \frac{x^2-1}{x-1} = \lim_{x \rightarrow 1} x+1 = 2.$$

(c) The function  $f$  will be discontinuous when  $x^2 + 3x - 4 = 0$ , ie. when  $x = 1$  or  $x = -4$ .

*Note: Points will be deducted for incomplete or incorrect answers. Points will also be deducted for not fully or properly showing your work.*