2) c) if we have

$$\sec(x+y) + \csc(x+y) = 5$$

then by differentiation we get

$$\sec(x+y)\tan(x+y)\left(1+\frac{dy}{dx}\right) - \csc(x+y)\cot(x+y)\left(1+\frac{dy}{dx}\right) = 0$$

$$\frac{dy}{dx}\left(\sec(x+y)\tan(x+y) - \csc(x+y)\cot(x+y)\right)$$

$$= \csc(x+y)\cot(x+y) - \sec(x+y)\,\cancel{\sec}\tan(x+y)$$

we get

$$\frac{dy}{dx} = \frac{\csc(x+y)\cot(x+y) - \sec(x+y)\tan(x+y)}{\sec(x+y)\tan(x+y) - \csc(x+y)\cot(x+y)}$$

$$= -1$$

d) $f(x) = \sqrt{8-2x-x^2}$ on $[-3, 2]$

let us find the absolute extrema of f

$f(x) = \sqrt{9-(x+1)^2}$ is defined if $(x+1)^2 \le 9$

ie if $|x+1| \le 3$ ie $-4 \le x \le 2$

$$f'(x) = \frac{-2x-2}{2\sqrt{8-2x-x^2}} = \frac{-(x+1)}{\sqrt{8-2x-x^2}}$$

$-4 < x < 2$