

1. Two lines are parallel when they have the same slope.

The slope of $y=3x+1$ is 3.

The slope of the tangent line of $f(x) = \frac{2x-1}{x+1}$ at x is given by the derivative:

$$f'(x) = \frac{(x+1) \cdot 2 - (2x-1)(1)}{(x+1)^2}$$
$$= \frac{3}{(x+1)^2}$$

These are the same when:

$$\frac{3}{(x+1)^2} = 3$$

$$(x+1)^2 = 1$$

$$x=0 \text{ or } -2$$

L9 P3

2. (i)

$$\frac{d^2}{dx^2} [(5x^2-3)(7x^3+x)]$$

$$= \frac{d}{dx} [(10x)(7x^3+x) + (5x^2-3)(21x^2+1)]$$

$$= \frac{d}{dx} [(10x)(7x^3+x)] + \frac{d}{dx} [(5x^2-3)(21x^2+1)]$$

$$= (10)(7x^3+x) + (10x)(21x^2+1) \\ + (10x)(21x^2+1) + (5x^2-3)(42x)$$

$$(ii) \quad \frac{d^2}{dx^2} [(5x^2-3)(7x^3+x)]$$

$$= \frac{d^2}{dx^2} [35x^5 - 16x^3 - 3x]$$

$$= \frac{d}{dx} [175x^4 - 48x^2 - 3]$$

$$= 700x^3 - 96x$$