

$$y = \sqrt{x}(x+2)$$

$$u = x^{\frac{1}{2}}$$

$$v = x+2$$

$$\frac{du}{dx} = \frac{1}{2}x^{-\frac{1}{2}}$$

$$\frac{dv}{dx} = 1$$

$$\frac{dy}{dx} = (x+2)\left(\frac{1}{2}x^{-\frac{1}{2}}\right) + (x^{\frac{1}{2}})(1)$$

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

$$= \frac{3}{2}x^{\frac{1}{2}} + x^{-\frac{1}{2}} \quad \checkmark$$

$$= \frac{3}{2}\sqrt{x} + \frac{1}{\sqrt{x}}$$

2006
LC4

$$y = (1+7x)^3$$

$$y' = 3(1+7x)^2(7)$$

$$= 21(1+7x)^2$$

2005
LC4

$$y = \frac{1}{2+5x} = (2+5x)^{-1}$$

2004
LCH

$$\frac{dy}{dx} = -1 (2+5x)^{-2} (5)$$

$$= -5 (2+5x)^{-2} \quad \checkmark$$

$$= \frac{-5}{(2+5x)^2}$$

$$y = \sqrt{1+4x} = (1+4x)^{\frac{1}{2}}$$

2003
LCH

$$\frac{dy}{dx} = \frac{1}{2} (1+4x)^{-\frac{1}{2}} (4)$$

$$= 2(1+4x)^{-\frac{1}{2}} \quad \checkmark$$

$$y = (x^4 + 1)^5$$

2002
LC4

$$\frac{dy}{dx} = 5(x^4 + 1)^4 (4x^3)$$

$$= 20x^3 (x^4 + 1)^4$$

(a)

$$y = \frac{x}{1+x^2}$$

2001
LC4

$$u = x$$

$$v = 1+x^2$$

$$\frac{du}{dx} = 1$$

$$\frac{dv}{dx} = 2x$$

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

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

(b)

2001
LCH

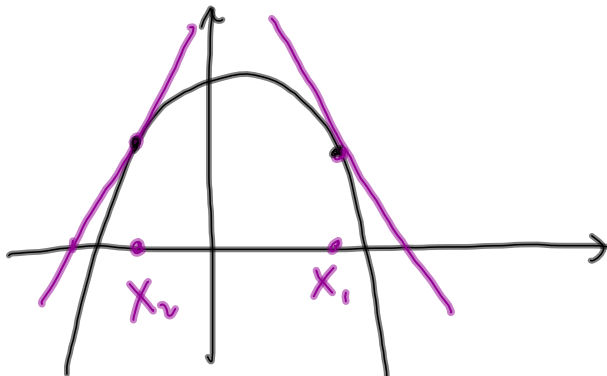
$$y = \sqrt{x} = x^{\frac{1}{2}}$$

$$\frac{dy}{dx} = \frac{1}{2} x^{-\frac{1}{2}} \quad \checkmark$$

$$= \frac{1}{2\sqrt{x}}$$

Slope? $y = \text{function}$

$$\frac{dy}{dx} = \text{Slope}$$

*may depend
on x value*

1C4 Questions from Old T&T.

P.184
Q11

$$y = x^2 - 2x - 3$$

Slope at (2,3)

$$\text{Slope} = \frac{dy}{dx} = 2x - 2$$

$$\frac{dy}{dx} (x=2) = 2(2) - 2 = 4 - 2 = 2$$

Q4

$$y = \sqrt{x} (2x - 1)$$

$$u = x^{\frac{1}{2}}$$

$$v = 2x - 1$$

$$\frac{du}{dx} = \frac{1}{2} x^{-\frac{1}{2}}$$

$$\frac{dv}{dx} = 2$$

$$\frac{dy}{dx} = (x^{\frac{1}{2}})(2) + (2x - 1)\left(\frac{1}{2}x^{-\frac{1}{2}}\right)$$

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

$$= 3x^{\frac{1}{2}} - \frac{1}{2}x^{-\frac{1}{2}} \quad \checkmark$$

$$= \frac{3\sqrt{x}}{1} - \frac{1}{2\sqrt{x}} = \frac{6x - 1}{2\sqrt{x}}$$

Q5

$$y = (\sqrt{x} + 4)(\sqrt{x} - 4) = \sqrt{x}^2 - 4^2 = x - 16$$

$$\frac{dy}{dx} = 1$$

Q8

$$f(x) = \sqrt{4x + 1} = (4x + 1)^{\frac{1}{2}}$$

$$f'(x) = \frac{1}{2} (4x + 1)^{-\frac{1}{2}} (4)$$

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