

# *Calculus Rules*

**1. Chain Rule**  $\frac{d}{dx}(u^n) = nu^{n-1} \times u'$

“BRING DOWN the POWER, LOWER the POWER, DIFF the INSIDE”

e.g. (i)  $y = (2x+1)^2$

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

(iii)  $y = (x^2 - 10)^3$

$$\frac{dy}{dx} = 3(x^2 - 10)^2 (2x)$$
$$= \underline{6x(x^2 - 10)^2}$$

(ii)  $y = (3x-4)^7$

$$\frac{dy}{dx} = 7(3x-4)^6 (3)$$
$$= \underline{21(3x-4)^6}$$

(iv)  $y = 5(4-2x)^6$

$$\frac{dy}{dx} = 30(4-2x)^5 (-2)$$
$$= \underline{-60(4-2x)^5}$$

$$\frac{dy}{dx} = \frac{dy}{dt} \times \frac{dt}{dx}$$

$$(vi) \quad x = 4t \qquad y = 2t^2$$

$$\frac{dx}{dt} = 4 \qquad \frac{dy}{dt} = 4t$$

$$\frac{dy}{dx} = \frac{dy}{dt} \times \frac{dt}{dx}$$

$$= 4t \times \frac{1}{4}$$

$$= \underline{t}$$

**Exercise 9E; 2adf, 3be, 6b, 8af, 10, 12a, 13ac, 14b, 16, 17, 18**