

July 2018 (Resit):

① a) $y = 9x^3 + 4x^2 + 7x + 5$

$$\frac{dy}{dx} = 27x^2 + 8x + 7$$

b) $y = (x+3)(x+4)$

$$y = x^2 + 7x + 12$$

$$\frac{dy}{dx} = 2x + 7$$

c) $y = \ln x + e^{8x} + 6\sqrt{x}$

$$y = \ln x + e^{8x} + x^{1/2}$$

$$\frac{dy}{dx} = \frac{1}{x} + 8e^{8x} + \frac{1}{2}x^{-1/2}$$

d) $y = 3 \sin 2x$

$$\frac{dy}{dx} = 6 \sin 2x$$

e) $y = e^{6x} \cos x$
 $\downarrow \quad \quad \downarrow$
 $(u) \quad (v)$

$$\frac{du}{dx} = 6e^{6x} \quad \frac{dv}{dx} = -\sin x$$

$$\frac{dy}{dx} = (\cos x)(6e^{6x}) + (e^{6x})(-\sin x)$$

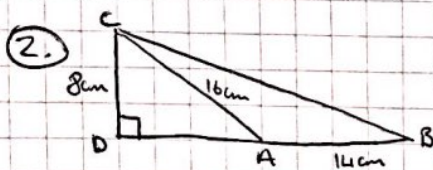
f) $y = \frac{\sin x}{x^2 + 2x + 3} \rightarrow (u)$
 $x^2 + 2x + 3 \rightarrow (v)$

$$\frac{du}{dx} = \cos x \quad \frac{dv}{dx} = 2x + 2$$

$$\frac{dy}{dx} = \frac{(x^2 + 2x + 3)(\cos x) - (\sin x)(2x + 2)}{(x^2 + 2x + 3)^2}$$

g) $y = (3x^3 + 2x + 1)^5$

$$\frac{dy}{dx} = 5(3x^3 + 2x + 1)^4(9x^2 + 2)$$



i) Angle CAD:

ii) Angle CAD:

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{8}{\sin A} = \frac{16}{\sin 90^\circ}$$

$$\frac{8 \sin 90^\circ}{16} = \sin A$$

$$\sin A = \frac{1}{2}$$

④ a) $\sin x = 0.32$

$x = \sin^{-1}(0.32)$

$x = 18.66^\circ$

$x = 180 - 18.66$

$x = 161.34^\circ$

b) $\cos x = -0.56$

$x = \cos^{-1}(0.56)$

$x = 55.94$

$x = 180 - 55.94$

$x = 124.06^\circ$

$x = 180 + 124.06 = 304.06$

$x = 235.94^\circ$

⑤ a) $\int 8x^2 + 3x + 5 \, dx$

$y = \frac{8x^3}{3} + \frac{3x^2}{2} + 5x + c$

b) $\int \frac{3}{x^4} \, dx$

$\int 3x^{-4} \, dx$

$y = \frac{3x^{-3}}{-3} + c$

c) $\int 3 \cos 2x \, dx$

$y = \frac{3}{2} \sin(2x) + c$

d) $\int_0^3 (x+3)(x+4) \, dx$

$\int x^2 + 7x + 12 \, dx$

$y = \frac{x^3}{3} + \frac{7x^2}{2} + 12x + c$

$y = \frac{x^3}{3} + \frac{7x^2}{2} + 12x + c$

③ $\frac{(3^3)}{3} + \frac{7(3^2)}{2} + 12(3) + c$

$= \frac{27}{3} + \frac{63}{2} + 36 + c$

$= 9 + 31.5 + 36 + c$

$= 76.5 + c - (0)$

$y = 76.5 + c$

e) $\int_1^2 e^{3x} + \sqrt[3]{x} \, dx$

$y = \frac{1}{3} e^{3x} + x^{1/3} + c$

② $y = \frac{1}{3} e^{3(2)} + (2^{1/3}) + c$

$y = 134.48 + 0.67$

② $y = 135.15$

① $y = \frac{1}{3} e^{3(1)} + 1^{1/3} + c$

$y = 7.03$

② - ① $= 135.15 - 7.03$

$y = 128.12 + c$