

0/3 and the rest? Find the equation of the tangent.

ii) $y = mx + c$
 $m = -\frac{2}{3}$ and it goes through the point (2, 1)
 $1 = -\frac{2}{3} \times 2 + c$
 $c = \frac{7}{3}$
 $y = -\frac{2}{3}x + \frac{7}{3}$

$$\frac{dy}{dx} = -\frac{2x}{3y^2}$$

At (2, 1), $\frac{dy}{dx} = -\frac{2 \times 2}{3 \times 1^2} = -\frac{4}{3}$

c) i) $\frac{A}{(x+1)^2} + \frac{B}{x+1} = \frac{A}{(x+1)^2} + \frac{B(x+1)}{(x+1)^2}$
 $= \frac{A+B(x+1)}{(x+1)^2}$

ii) $\frac{A}{(x+1)^2} + \frac{B}{x+1} = \frac{A+B(x+1)}{(x+1)^2} = \frac{x}{(x+1)^2}$ ✓

Hence $A+B(x+1) = x$ ✓

$A+Bx+B = x$

$x=0 \Rightarrow A+B=0 \Rightarrow A=-B$

$x=1 \Rightarrow A+2B=1$

Sub in $A=-B$, then $A+2B=-B+2B=B=1$ ✓
 and $A=-1$ ✓

2/2

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

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

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

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

$= (x+1)^{-1} + \ln(x+1) + C$ ✓

$= \frac{1}{x+1} + \ln(x+1) + C$ ✓

2/2

d) $\int \frac{t^2}{1+t^3} dt = \frac{1}{3} \int \frac{3t^2}{1+t^3} dt$

$3t^2 = \frac{d}{dt}(1+t^3)$ so top is differential of bottom

and $\frac{1}{3} \int \frac{3t^2}{1+t^3} dt = \frac{1}{3} \ln(1+t^3) + C$ ✓

3/3

good ✓
 well spotted