

GR 2

## Mathematics 1

## Final Exam

24/12/2018

\* Solve just three questions.

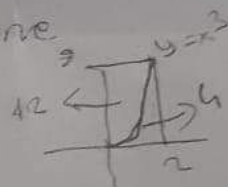
1) If  $F = x \int \frac{\tan x}{x^2} dt$  ( $x$  and  $t$  are independent variables)  
 find  $\frac{dF}{dx}$

$\frac{d}{dx} \left( x \int \frac{\tan x}{x^2} dt \right) = x \cdot \frac{d}{dx} \left( \int \frac{\tan x}{x^2} dt \right) + \int \frac{\tan x}{x^2} dt \cdot \frac{d}{dx} (x)$   
 $= x \cdot \left( \frac{1}{x^2} \cdot \tan x \right) + \int \frac{\tan x}{x^2} dt \cdot x$   
 $= \frac{\tan x}{x} + x \int \frac{\tan x}{x^2} dt$

2) Solve  $\int_{-1}^1 x^3 e^{x^2} dx$

$\int_{-1}^1 x^3 e^{x^2} dx = \int_{-1}^1 x^2 \cdot x e^{x^2} dx$   
 Let  $u = x^2$ , then  $du = 2x dx$   
 $\int_{-1}^1 x^2 \cdot x e^{x^2} dx = \frac{1}{2} \int_{-1}^1 u e^u du$   
 $= \frac{1}{2} \left[ u e^u - e^u \right]_{-1}^1$   
 $= \frac{1}{2} \left( (1 \cdot e - e) - (-1 \cdot e - e) \right)$   
 $= \frac{1}{2} (0 - (-2e)) = e$

3) The region is bounded by the curve  $y = x^3$ , the line  $y = 8$  and  $y$ -axis.  
 Find area of the given region.



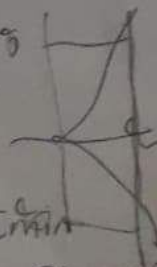
4)  $y = x^{2/3}$   $0 \leq x \leq 8$

Find length of given curve.

(y-axis)

$$\int_0^8 x^{2/3} dx = \left[ \frac{3}{5} x^{5/3} \right]_0^8 = \frac{3}{5} \cdot 8^{5/3} = \frac{3}{5} \cdot 32 = \frac{96}{5}$$

5) The region bounded by the curve  $y = x^3$ , the line  $y = 8$  and  $y$ -axis is revolved about  $x$ -axis. Find volume of generated solid.



GOOD LUCK...

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