Start here for Question Number: 5

a) i) $A = 2\pi r^2 + 2\pi rh$

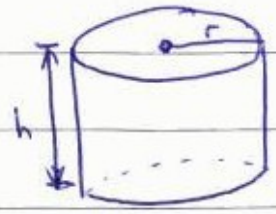
$A = 2\pi r^2 + \frac{20}{r}$

$\therefore A$ must equal $2\pi r^2 + \frac{20}{r}$

$V = 10m^3$

for V to $= 10m^3$

$h = 5 \quad r = 2$



Volume $= 10m^3$

ii) A = minimum value

A minimum value = smallest area of surface

surface area minimum value occurs when r is as close to zero as possible.

$A = 2\pi(0.000001)^2 + \frac{20}{(0.000001)}$

A = minimal value.

b) i) $\sec^2 x + \sec x \tan x = \frac{1+\sin x}{\cos^2 x}$

$\frac{1+\sin x}{\cos^2 x}$

$\cos^2 x = \sec^2 x \qquad \frac{\sin}{\cos} = \tan \qquad \cos = \frac{1}{\sec}$

$\frac{1+\sin x}{\cos^2 x}$

$\sec^2 x + \sec x \tan x = \frac{1+\sin x}{\cos^2 x}$

ii) $\sec^2 x + \sec x \tan x = \frac{1}{1-\sin x}$

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

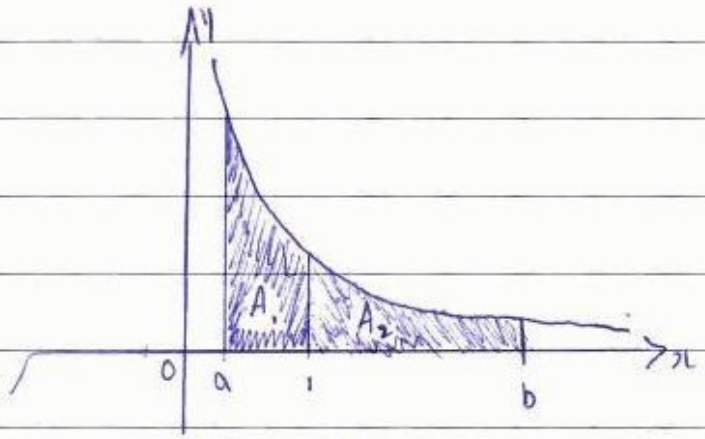
iii) $\int_{\frac{\pi}{4}}^{\frac{\pi}{4}} \frac{1}{1-\sin x} = \sec^2 x + \sec x \tan x.$

$= \tan^{-1} \sin x$

$= \tan^{-1} \sin\left(\frac{\pi}{4}\right)$

$= 4.935 \times 10^{-12}$ by calculator.

c) $y = \frac{1}{x}$, for $x > 0$



$A_1 = 1 \text{ unit}^2$

$A_2 = 1 \text{ unit}^2$

$a = 0.4$

$b = 3.5$

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