Name: KEY	ID: KEY	Sec: 34(11:00-11:50) 23(1:10-2:00)

MATH-102 Term-132 Class-QUIZ-7

(show all your work)

1) If $\tanh x = -\frac{3}{4}$ then find $\sinh x$

$\cosh^2 x - \sinh^2 x = 1$

$1 - \tanh^2 x = \operatorname{sech}^2 x$

$\operatorname{sech}^2 x = 1 - \tanh^2 x = 1 - \frac{9}{16} = \frac{7}{16}$

$\Rightarrow \operatorname{sech} x = \sqrt{7}/4$ (Note that cosh always positive)

$\Rightarrow \cosh x = 4/\sqrt{7}$

Now, $\cosh^2 x - \sinh^2 x = 1 \Rightarrow \cosh^2 x = 1 + \sinh^2 x$

or $\sinh^2 x = -1 + \cosh^2 x$

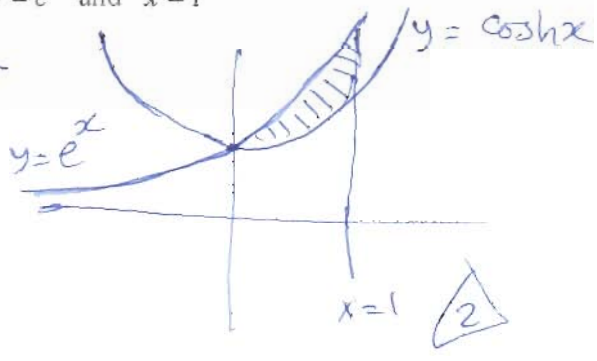
$\sinh^2 x = -1 + \frac{16}{7} = \frac{9}{7} \Rightarrow \sinh x = \frac{-3}{\sqrt{7}}$ 10

Note that: $\tanh x$ is negative $\Rightarrow \sinh x$ is negative

2) Find the area of the region enclosed by the curves $y = \cosh x$, $y = e^x$ and $x = 1$

$$\text{Area} = \int_0^1 (e^x - \cosh x)\,dx$$ 3

$$= \left[e^x - \sinh x \right]_0^1$$ 3



$$= \left[e - \sinh(1) \right] - \left[1 - \sinh(0) \right]$$

$$= \left[e - \sinh(1) \right] - \left[1 - 0 \right]$$

$$= e - \sinh(1) - 1$$ 2