THE UNIVERSITY OF JORDAN

0301101 Calculus I   First test   Oct. 31, 2015

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For instructor use only, please do not write in this table.

Q1	Q2	Q3	Q4	Grade
4.5	1	6	2	17

Q1) Fill in the blanks with the answers only. Each part is worth 1.5 marks.

1) The solution of the equation $\ln(x) - \ln(3x - 4) = 0$ is ... $x = 2$

2) $\sin\left(\frac{7\pi}{6}\right) = -\frac{1}{2}$

3) The domain of $f(x) = \ln\left(\frac{x-2}{x-4}\right)$ is $(2, \infty)$

4) The range of $g(x) = 2 - \sqrt{x}$ is $(-\infty, 2]$

5) $\tan\left(\cos^{-1}\left(\frac{-1}{4}\right)\right) = -\sqrt{15}$

6) If $f(x) = \frac{2}{x}$ and $g(x) = \frac{x+1}{x+5}$, then the domain of $g \circ f$ is $\mathbb{R} - \left\{0, \frac{-2}{5}\right\}$

7) $\cos^{-1}\left(\cos\left(\frac{19\pi}{5}\right)\right) = \frac{4\pi}{5}$

Q2) (1 mark) Sketch the graph of $y = \log_{0.5}(x)$.
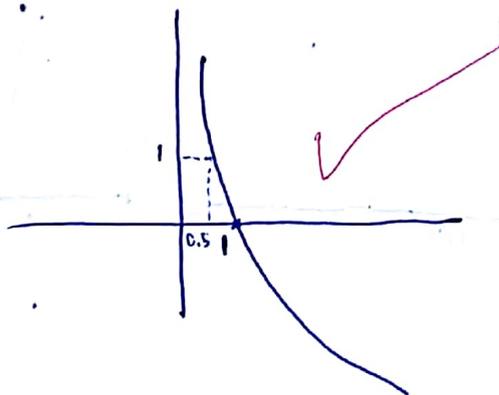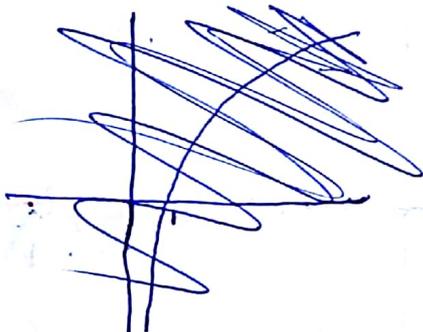
In questions 3 and 4, write every step of your work.

Q3) Let $f(x) = \left(\frac{1+e^x}{1-e^x}\right)$.

1) (3 marks) Find $f^{-1}(x)$.

let $f(x) = y$

$y = \frac{1+e^x}{1-e^x}$

$(1-e^x)y = 1+e^x$

$y - ye^x = 1+e^x$

$y - ye^x - e^x = 1$

$-ye^x - e^x = 1 - y$

$e^x(-y-1) = 1 - y$

$e^x = \frac{1+y}{1-e^x}$

let $fx = y$

$y = \frac{1+e^x}{1-e^x}$

$y - ye^x = 1 + e^x$

$y - 1 = ye^x + e^x$

$y - 1 = e^x(y+1)$

$e^x = \frac{y-1}{y+1}$

Change $x = y$

$e^y = \frac{x-1}{x+1}$

$\cancel{\times}$

$y = \ln\frac{x-1}{x+1}$

$\cancel{\times}$

③

2) (3 marks) Show that f is symmetric with respect to the origin.

respect to the orgin means that f, is an odd fun.

So $\Rightarrow$ $f(x) = f(-x) = -fx$

$f(-x) = \frac{1+e^{-x}}{1-e^{-x}}$

$f-x = \frac{1+\frac{1}{e^x}}{1-\frac{1}{e^x}}$

$= \frac{\frac{e^x+1}{e^x}}{\frac{e^x-1}{e^x}}$

$f_{-x} = \frac{e^x+1}{e^x-1}$

$f(-x) = \frac{e^x+1}{-(1-e^x)} = \frac{\cancel{\times}}{\cancel{\times}} = -\frac{1+e^x}{1-e^x}$

③

$f(-x) = -fx$ $\cancel{\times}$

Q4)(3 marks) Sketch the graph of $y = \tan\left(\frac{\pi}{4} - x\right)$ using the graph of $y = \tan(x)$.

$y = \tan x$

$y = \tan(-x)$

$y = \tan\left(\frac{\pi}{4} - x\right)$