Math. 1007 A, Fall 2012

TEST 1

Time: 50 minutes (No calculators or any other electronic aids are permitted.)

Print Name : _____

Student Number: _____

1. [6 marks] Let $f = \frac{1}{x}$ and $g = \sqrt{x-2}$. Find the composition function $f \circ g$ and its domain.

$f \circ g(x) = f(g(x)) = \dfrac{1}{\sqrt{x-2}}$ (3)

$D(f \circ g) = \{x \in D(g) : g(x) \in D(f)\} = (2, +\infty)$ (3)

2. Simplify as much as possible:

a. [2 marks] $(12)^{\frac{1}{2}}(3)^{\frac{1}{2}} =$ $(12 \times 3)^{\frac{1}{2}} = 36^{\frac{1}{2}} = \sqrt{36} = 6$ (1) (1)

b. [2 marks] $(0.38)^x(0.38)^{-x} =$ $(0.38)^{x-x} = (0.38)^0 = 1$ (1) (1)

c. [2 marks] $\sin^2(\frac{3\pi}{4}) + \cos^2(\frac{3\pi}{4}) =$ 1

d. [2 marks] $\log_9 81 =$ 2

e. [2 marks] $\log_{81} 9 =$ $\frac{1}{2}$

f. [2 marks] $e^{\ln 3 - \ln \sqrt{3}} =$ $e^{\ln \frac{3}{\sqrt{3}}} = \frac{3}{\sqrt{3}} = \sqrt{3}$ (1) (1)

g. [2 marks] $\ln(\ln e^e) =$ $\ln(e \ln e) = \ln e = 1$ (1) (1)

3. Solve the following equations for x.

a. [4 marks] $\log_5(2x+1) = 1$ $\Rightarrow 2x+1 = 5 \Rightarrow x = 2$ (3) (1)

b. [4 marks] $e^{2+\ln x} = 1$ (2) $\Rightarrow 2 + \ln x = 0 \Rightarrow \ln x = -2$

$\Rightarrow x = e^{-2}$ (2)

4. Find the following values:

a. [2 marks] $\cos^{-1}(-1) =$ π

b. [2 marks] $\sin^{-1}(1) =$ $\frac{\pi}{2}$

5. If $0 \le x \le \pi$ is such that $\cos x = \frac{-\sqrt{2}}{2}$, then find

a. [4 marks] $\sin x = \sqrt{1-\cos^2 x}$ (2) $= \sqrt{1-\left(\frac{-\sqrt{2}}{2}\right)^2}$ (1) $= \sqrt{1-\frac{1}{2}}$

$= \sqrt{\frac{1}{2}} = \frac{\sqrt{2}}{2}$ (1)

b. [2 marks] $\tan x =$ (1) $\frac{\sin x}{\cos x} = \frac{\frac{\sqrt{2}}{2}}{\frac{-\sqrt{2}}{2}} = -1$ (1)

b. [2 marks] $\cot x =$

$\frac{1}{\tan x} = \frac{1}{-1} = -1$

(1) (1)