

King Fahd University of Petroleum and Minerals



Dammam Community College

Term 162

Code A

PREPARATORY YEAR - **Math 012**

Class Test 1
March 07, 2017

Time allowed: 60 Minutes

Name: Marking scheme ID. _____ Sec # xy

Read the following instructions:

1. This test consists of eight questions.
2. You must show all necessary steps of your solution to earn full credit.
3. The use of calculators is not allowed.
4. This test worth 8% of the total marks allocated to this course.

<u>Question</u>	<u>Marks</u>
1.	/4
2.	/4
3.	/4
4.	/4
5.	/4
6.	/4
7.	/4
8.	/4
<u>Total Marks</u>	/32

Question 1: If $f(x) = -\sqrt{x+2}$, $x \geq -2$. Find $f^{-1}(x)$ and its domain.

(4 Points)

$$R_f = (-\infty, 0]$$

$$(f)^2 = (-\sqrt{x+2})^2$$

$$y^2 = x+2 \longrightarrow (1)$$

$$x = y^2 - 2 \longrightarrow (1)$$

$$f^{-1}(x) = x^2 - 2 \longrightarrow (1)$$

$$D_{f^{-1}} = (-\infty, 0] \longrightarrow (1)$$

Question 2: Let $f(x) = \left(\frac{1}{4}\right)^{x-2} - 4$.

(4 Points)

a) Find the horizontal asymptote of the function $f(x)$.

$$\begin{aligned} \text{As } x &\rightarrow -\infty \\ y &\rightarrow -4 \end{aligned}$$

$$\therefore \text{H.A. } \boxed{y = -4} \rightarrow \textcircled{1}$$

b) Find the x -intercept and y -intercept of the function $f(x)$.

x -Intercept

put $y = 0$

$$0 = \left(\frac{1}{4}\right)^{x-2} - 4$$

$$\left(\frac{1}{4}\right)^{x-2} = 4 \rightarrow \textcircled{\frac{1}{2}}$$

$$\left(\frac{1}{4}\right)^{x-2} = \left(\frac{1}{4}\right)^{-1} \rightarrow \textcircled{\frac{1}{2}}$$

$$\therefore x-2 = -1 \Rightarrow \boxed{x = 1} \rightarrow \textcircled{1}$$

y -Intercept

put $x = 0$

$$y = \left(\frac{1}{4}\right)^{0-2} - 4 = 16 - 4 = 12 \rightarrow \textcircled{1}$$

Question 3: Find the solution set of the equation:

$$\ln(x+6) - \ln(x+2) = \ln x$$

(4 Points)

$$\ln \left[\frac{x+6}{x+2} \right] = \ln x$$

$$\frac{x+6}{x+2} = x \quad \longrightarrow \textcircled{1}$$

$$x+6 = x(x+2)$$

$$x^2 + x - 6 = 0 \quad \checkmark \textcircled{1}$$

$$(x+3)(x-2) = 0$$

$$\therefore x = -3 \text{ or } x = 2 \quad \longrightarrow \textcircled{1}$$

check

\times $x = -3$: $\ln x = \ln(-3)$ undefined.

\checkmark $x = 2$: $\ln(2+6) - \ln(2+2) \stackrel{?}{=} \ln 2$

$$\ln \frac{8}{4} = \ln 2$$

$$S.S = \{2\} \quad \longrightarrow \textcircled{1}$$

Question 4: Simplify the given expression:

$$(\log_3 5)(\log_5 7)(\log_7 81)(\sqrt{2})^{-\log_2 \left(\frac{1}{25}\right)}$$

(4 Points)
 $2^{-\frac{1}{2} \log_2 \left(\frac{1}{25}\right)}$
①

$$= \frac{\cancel{\log 5}}{\log 3} \cdot \frac{\log 7}{\cancel{\log 5}} \cdot \frac{\log 81}{\cancel{\log 7}}$$

$$= \frac{\log 81}{\log 3} \cdot 2^{\log_2 25^{1/2}} \rightarrow \text{①}$$

$$= (\log_3 81) (\sqrt{25}) \rightarrow \text{①}$$

$$= (\log_3 3^4) (5) \rightarrow \text{①}$$

$$= (4)(5) = 20 \rightarrow \text{①}$$

Question 5: Find the exact value of the expression $\sin(-510^\circ) + \cos(300^\circ)$ (4 Points)

$$\text{Coterminal } (-510^\circ) = -510^\circ + 2(360^\circ) \\ = 210^\circ \rightarrow \textcircled{1}$$

$$\text{Reference } (210^\circ) = 210^\circ - 180^\circ = 30^\circ$$

$$\therefore \sin(-510^\circ) = \sin(210^\circ) = -\sin 30^\circ \\ = -\frac{1}{2} \rightarrow \textcircled{1}$$

$$\text{Reference of } (300^\circ) = 360^\circ - 300^\circ \\ = 60^\circ$$

$$\therefore \cos(300^\circ) = \cos(60^\circ) = \frac{1}{2} \rightarrow \textcircled{1}$$

$$\therefore \sin(-510^\circ) + \cos(300^\circ)$$

$$= -\frac{1}{2} + \frac{1}{2} = 0 // \rightarrow \textcircled{1}$$

Question 6: Find the solution set of the equation

$$e^{2x} - 5e^x + 6 = 0$$

(4 Points)

$$\text{Let } u = e^x$$

$$u^2 - 5u + 6 = 0 \rightarrow \textcircled{1}$$

$$(u - 3)(u - 2) = 0 \rightarrow \textcircled{1}$$

$$u = 3 \text{ or } u = 2 \rightarrow \textcircled{1}$$

$$e^x = 3 \text{ or } e^x = 2$$

$$x = \ln 3 \text{ or } x = \ln 2 \rightarrow \textcircled{1}$$

$$S, S = \{ \ln 2, \ln 3 \} \rightarrow \textcircled{1}$$

Question 7: Given the angles $\alpha = 26^{\circ} 25' 21''$ and $\beta = 32^{\circ} 01' 41''$. Find the angle $\beta - \alpha$.

(4 Points)

$$\begin{array}{r} \beta = 32^{\circ} 01' 41'' \\ - \alpha = 26^{\circ} 25' 21'' \\ \hline 5^{\circ} 36' 20'' \end{array} \Rightarrow \begin{array}{r} 31^{\circ} 61' 41'' \\ - 26^{\circ} 25' 21'' \\ \hline 5^{\circ} 36' 20'' \end{array}$$

Arrows point from the circled '1' in the final result to the circled '1' in the original problem statement.

Question 8: Give that $\tan \theta = -\frac{4}{3}$ where θ is in quadrant II. Find the value of $-5 \sin \theta$.

(4 Points)

$$\begin{aligned} \tan \theta &= \frac{y}{x} = \frac{4}{-3} \\ x &= -3, y = 4 \rightarrow \textcircled{1} \\ r &= \sqrt{16 + 9} \\ &= 5 \rightarrow \textcircled{1} \\ -5 \sin \theta &= -5 \cdot \frac{4}{5} = \underline{\underline{-4}} \rightarrow \textcircled{1} \\ &\quad \downarrow \\ &\quad \textcircled{1} \end{aligned}$$
