King Fahd University of Petroleum and Minerals
Dammam Community College

MATH 012
Class Test 2

CODE B

Term 171
November 21, 2017

Name: Marking scheme ID # _____ Sec # ____

This test consists of 6 questions.

Time allowed. 60 minutes.

You must show all necessary steps of your solution.

Calculators are not allowed.

Question	Points
Q#1	/4
Q#2	/4
Q#3	/4
Q#4	/4
Q#5	/4
Q#6	/4
Total points =	/24

This test worth 8% of the total marks allocated to this course.

Question 1: Given that $\sin\alpha = \frac{1}{\sqrt{2}}$, α is in the first quadrant, and $\cos\beta = \frac{\sqrt{3}}{2}$, β in is in the fourth quadrant, then find $\sin(\alpha+\beta)$

$\cos\alpha = +\sqrt{1-\sin^2\alpha} = \sqrt{1-\frac{1}{2}} = \frac{1}{\sqrt{2}}$ (+1)

$\sin\beta = \sqrt{1-\cos^2\beta} = -\sqrt{1-\frac{3}{4}} = -\sqrt{\frac{1}{4}} = -\frac{1}{2}$ (+1)

$\sin(\alpha+\beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$ (+1/2)

$= \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{3}}{2} - \frac{1}{2} \cdot \frac{1}{\sqrt{2}}$ (+1)

$= \frac{\sqrt{3}}{2\sqrt{2}} - \frac{1}{2\sqrt{2}} = \frac{\sqrt{3}\cdot 1}{2\sqrt{2}} = \frac{\sqrt{6}-\sqrt{2}}{4}$ (+1/2)

Question 2: Find all x-intercepts of the graph of $y = 3\tan\left(\frac{x}{2} - \pi\right)$, over $-3\pi \le x \le 3\pi$.

x-intercepts $\frac{x}{2} - \pi = n\pi$ (+1.5)

$\frac{x}{2} = n\pi + \pi$

(+1) $x = 2n\pi + 2\pi$, $n = 0, \pm 1, \pm 2, \ldots$

$n = 0 \Rightarrow x = 2\pi$

$n = -1 \Rightarrow x = 2(-1)\pi + 2\pi = 0$

$n = -2 \Rightarrow x = 2(-2)\pi + 2\pi = -2\pi$

(+1/2) for each

Question 3:

a) If $A = 3\sin^2(2x) + 3\cos^2(2x)$ and $B = 5\tan^2(x) - 5\sec^2(x)$. Find $A - B$.

$A = 3(\sin^2(2x) + \cos^2(2x)) = 3(1) = 3$ (+½)

$B = 5(\tan^2(x) - \sec^2(x))$ (+½)

$= 5(\tan^2(x) - (\tan^2(x) + 1))$ (+½)

$= 5(-1) = -5$

$A - B = 3 - -5 = 8$ (+½)

b) Verify $\tan^2 x\,(\cot^2 x + 1) = \sec^2 x$

$L.H.S = \tan^2(x)(\csc^2 x)$ (+½)

$= \frac{\sin^2 x}{\cos^2 x} \cdot \frac{1}{\sin^2 x}$ (+½)

$= \frac{1}{\cos^2 x}$ (+½)

$= \sec^2 x = R.H.S$ (+½)

Question 4: Find the exact value of $\sqrt{3}\sin\left(\frac{17\pi}{3}\right) \quad -\sqrt{3}\tan\left(\frac{25\pi}{6}\right)$

Coterminal of $\frac{17}{3}\pi = \frac{17\pi}{3} - \frac{12\pi}{3} = \frac{5\pi}{3}$ (+1)

reference angle $= 2\pi - \frac{5\pi}{3} = \frac{\pi}{3}$

$\sin\left(\frac{17\pi}{3}\right) = \sin\left(\frac{5\pi}{3}\right) = -\sin\left(\frac{\pi}{3}\right) = -\frac{\sqrt{3}}{2}$ (+1)

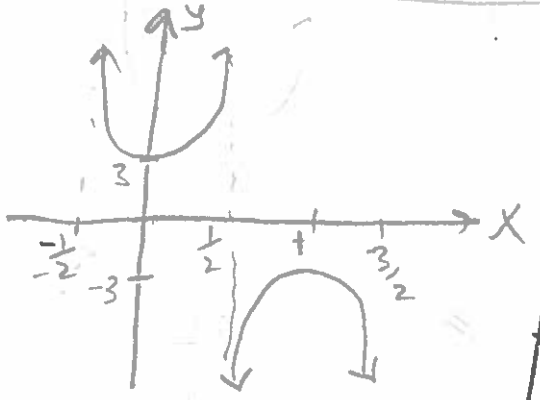
Coterminal of $\frac{25\pi}{6} = \frac{25\pi}{6} - 4\pi = \frac{\pi}{6}$ (+1)

$\tan\left(\frac{25\pi}{6}\right) = \tan\left(\frac{\pi}{6}\right) = \frac{1}{\sqrt{3}}$ (+½)

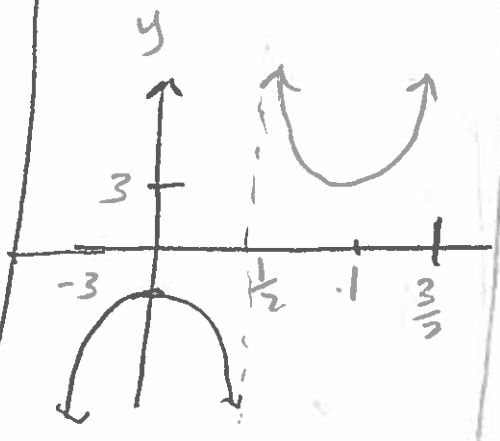
$\sqrt{3}\sin\left(\frac{17\pi}{3}\right) - \sqrt{3}\tan\left(\frac{25\pi}{6}\right) = -\sqrt{3}\cdot\frac{\sqrt{3}}{2} - \sqrt{3}\cdot\frac{1}{\sqrt{3}} = \frac{-3}{2} - 1 = \frac{-5}{2}$ (+1/2)

Question 5: Graph $y = -3\sec(\pi x - 2\pi) + 1$ over one period

$y = -3\sec(\pi(x-2)) + 1$ (+½) Period $= \frac{2\pi}{\pi} = 2$ (+½)

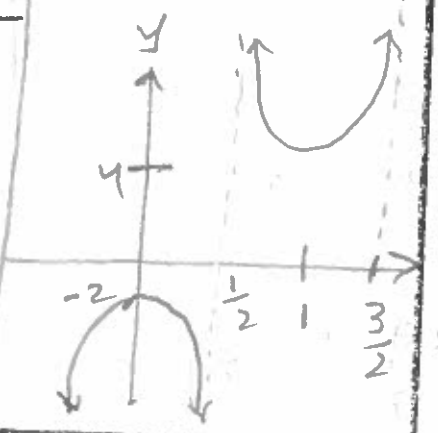


$y = 3\sec(\pi x)$



$y = -3\sec(\pi x)$

$y = -3\sec(\pi x - 2\pi) + 1$



Question 6: For the function $f(x) = -\cos\left(2\pi x - \frac{\pi}{2}\right) - 3$, A is the amplitude, P is period, M is its maximum value and m is its minimum value. Find $A + P + M + m$.

$A = |-1| = 1$ (+1)

$P = \frac{2\pi}{2\pi} = 1$ (+1)

$d = -3$

$M = A + d = 1 - 3 = -2$ (+½)

$m = -A + d = -1 - 3 = -4$ (+½)

$A + P + M + m = 1 + 1 - 2 - 4 = -4$ (+1)