

MAC 1114-Practice Test #3 (Chapters 5-6) Lial

1) If $\pi/2 < \theta < \pi$, use identities to find which of the following is/are equal to $\sin \theta$?

- a) $\frac{1}{2} \sin 2\theta$; b) $\cos(\pi/2 + \theta)$; c) $\cot \theta \sec \theta - \cot \theta \cos \theta$

2) (No calculator) Find the exact value of: Check with your calculator.

- a. $\cos^2(\pi/12) - \sin^2(\pi/12)$ g. $\sin(\pi/4 + \sin^{-1}(-2/5))$
b. $\cos^2(\pi/12) + \sin^2(\pi/12)$ h. $\csc^{-1}(-\sqrt{2})$
c. $\sin^{-1}(-\sqrt{2}/2)$ i. $\sec^{-1}(-2/\sqrt{3})$
d. $\sec(\tan^{-1}(4/3))$ j. $\cot^{-1}(-1/\sqrt{3})$
e. $\cos(\sin^{-1}(2/3) + \cos^{-1}(-5/13))$ k. $\sec^{-1}(-2)$
f. $\tan(\cos^{-1}(-3/5))$ l. $\cos^{-1}(-2)$

Answers: a) $\sqrt{3}/2$, b) 1, c) $-\pi/4$, d) $5/3$, e) $-(5\sqrt{5}+24)/39$, f) $-4/3$,
g) $\sqrt{2}/2(\sqrt{21}/5 - 2/5)$, h) $-\pi/4$, i) $5\pi/6$, j) $2\pi/3$, k) $2\pi/3$, l) undefined

3) (no calculator) If: (Check your answers with your calculator)

- a) $\tan x = 2$ and $\cos x < 0$, evaluate $\sin 2x$ exactly.
b) $\cot x = -3/4$ and $\cos x > 0$, find the value of $\tan(2x)$.
c) $\sec x = 5$ and $\tan x < 0$, find $\cos(2x)$
d) $\tan x = -2/5$, where x is in quadrant IV, find $\cos(x + 5\pi/6)$.
e) $\cos x = -1/3$, where x is in quadrant II and $\tan y = 1/2$, where y is in quadrant III, find $\sin(x+y)$.

Answers: a) $4/5$, b) $24/7$, c) $-23/25$, d) $(2 - 5\sqrt{3})/(2\sqrt{29})$, e) $(1 + 2\sqrt{8})/(3\sqrt{5})$,

4) Express:

- a) $\cos(\tan^{-1}x)$ as an expression of x , free of any trig function.
b) $\sin(2\cos^{-1}x)$ as an expression of x , free of any trig function.

Answers: a) $1/\sqrt{x^2+1}$, b) $2x\sqrt{1-x^2}$

Continue

- 5) If: a) $\sin x = \sqrt{7}/4$ and $5\pi/2 < x < 3\pi$, evaluate $\sin x/2$ exactly.
 b) $\cos x = 4/5$, and $3\pi/2 < x < 2\pi$, find the exact values of $\sin(x/2)$ and $\cos(x/2)$.
 c) $\cos(2\theta) = 1/2$ with θ in Π , find $\sin(\theta)$.

Answers: a) $-\sqrt{7/8}$, b) $1/\sqrt{10}, -3/\sqrt{10}$, c) $1/2$

- 6) a) Solve $\sin \theta = -1/2$ for θ . Check graphically.
 b) Evaluate $\theta = \sin^{-1}(-1/2)$.
 c) Explain the difference between parts a and b, if any.

Answers: a) $7\pi/6 + 2\pi k$ U $11\pi/6 + 2\pi k$ b) $-\pi/6$, c) $\sin \theta = -1/2$ has no restrictions, while $\sin^{-1}(-1/2)$ is restricted to the fourth quadrant

- 7) (No calculators) Find all solutions of:
 a) $1 + \tan(x) = 0$.
 b) $\cos^2 x = \sin(x) \cos(x)$.
 c) $4 \cos^2(x) - 4 \cos(x) + 1 = 0$ in $0 \leq x < 2\pi$.

Answers: a) $x = 3\pi/4 + k\pi$, b) $x = \pi/4 + k\pi$; $x = \pi/2 + k\pi$; c) $x = \pi/3$; $x = 5\pi/3$

- 8) (No calculators) Find all solutions in x over the interval $[0, 2\pi)$ of:
 a) $2 \cos(x/2) = 1$
 b) $\cos(2x) = -1/2$
 c) $\sin(x) = \sin(2x)$
 d) $\sec(x/2) = \cos(x/2)$

Answers: a) $2\pi/3$, b) $\pi/3, 2\pi/3, 4\pi/3, 5\pi/3$, c) $0, \pi, \pi/3, 5\pi/3$, d) 0

- 9) Find without graphing the first 4 positive solutions of: Check graphically.
 a) $2 \sin(\theta) \cos(\theta) = 1/2$ ans: $\pi/12, 5\pi/12, 13\pi/12, 17\pi/12$
 b) $8 \cos(x) = 6$ ans: $x = \cos^{-1}(3/4), 2\pi - \cos^{-1}(3/4), \cos^{-1}(3/4) + 2\pi, 4\pi - \cos^{-1}(3/4)$
 c) $4 \sin(x) - 1 = 0$ ans: $x = \sin^{-1}(.25), \pi - \sin^{-1}(.25), \sin^{-1}(.25) + 2\pi, 3\pi - \sin^{-1}(.25)$
 d) $\cos(x) + 2 = 0$ ans: no solution