(65 pts.)

MAC 1114 EXAM II MR. NADEL SPRING 2017

(5) ① Solve $\cos x = -1$ on $0 \le x \le 4\pi$.

(10) ② Sketch

a) $y = \tan\theta$ b) $y = \sec\theta$

(5) ③ Sketch

$$y = 3\csc(x - 45^\circ)$$

(10) ④ Sketch one cycle of

$$y = -3\sin(2x + 180^\circ)$$

(10) ⑤ a) Find $\cos(\tan^{-1}(-3))$ exactly. Include a picture of the angle in the correct quadrant.

3 pts.

b) Write $\cot(\sin^{-1}x)$ as an algebraic expression (without trig. or inverse trig functions.)

4 pts.

c) Find the exact value of $\tan^{-1}\left(\tan\left(\frac{2\pi}{3}\right)\right)$.

3 pts.

(10) ⑥ Prove

$$2\csc x = \frac{1+\cos x}{\sin x} + \frac{\sin x}{1+\cos x}$$

(15) ⑦ a) Simplify $\sin\left(x + \frac{\pi}{4}\right)$ completely.

b) Find $\tan 15^\circ$ using a difference formula. Give the exact value.

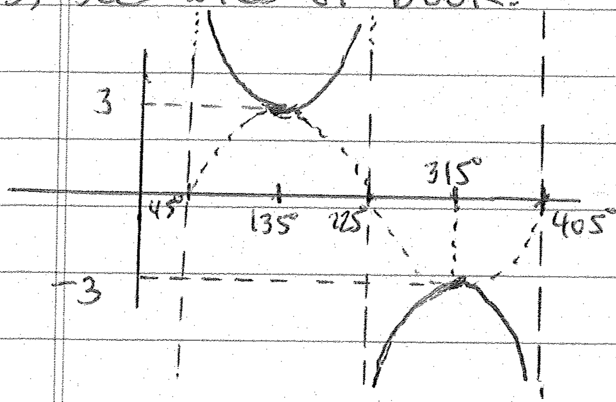
c) Find the exact value of $\cos 70^\circ \cos 40^\circ + \sin 70^\circ \sin 40^\circ$.

MAC 1114 EXAM II KEY (SP'17)

① $x = \pi, 3\pi$ from unit circle

② a), b) See notes or book.

③

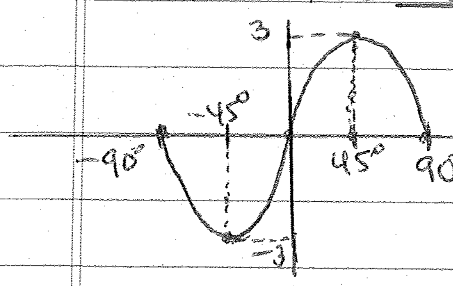


④ $y = -3\sin[2(x+90°)]$

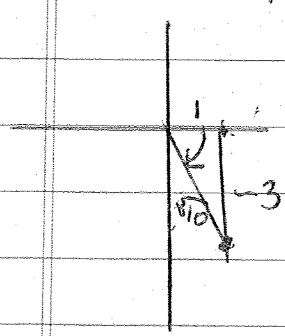
$\text{period} = \frac{360°}{2} = 180°$

$\text{steps} = \frac{180°}{4} = 45°$

90° shift to the left.

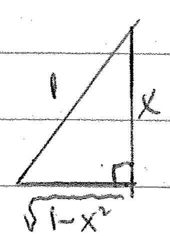


⑤ a)



$\frac{1}{\sqrt{10}} = \frac{\sqrt{10}}{10}$

b)



$\frac{\sqrt{1-x^2}}{x}$

⑤ c) $\tan^{-1}(-\sqrt{3}) = -\frac{\pi}{3}$

⑥ $\frac{1+\cos x}{\sin x} + \frac{\sin x}{1+\cos x}$

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

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

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

$= \frac{2\cancel{(1+\cos x)}}{\sin x\cancel{(1+\cos x)}} = 2\csc x$

⑦ a) $\sin x \cos\frac{\pi}{4} + \cos x \sin\frac{\pi}{4}$

$= \sin x\left(\frac{\sqrt{2}}{2}\right) + \cos x\left(\frac{\sqrt{2}}{2}\right)$

b) $\tan(60° - 45°) = \frac{\tan 60° - \tan 45°}{1 + \tan 60° \tan 45°}$

$= \frac{\sqrt{3} - 1}{1 + \sqrt{3}}$

c) $\cos(70° - 40°) = \cos 30°$

$= \frac{\sqrt{3}}{2}$