


# MAT 142 Homework #7 Key

①

1. See attached

2. a.   $\sin^{-1}(\frac{1}{2}) = \frac{\pi}{3}$

b.  $\tan^{-1}(-1) = -\frac{\pi}{4}$

c.  $\sin^{-1}(\sin \frac{\pi}{3}) = \frac{\pi}{3}$

d.  $\tan(\tan^{-1} 125) = 125$

e.  $\sin(\sin^{-1} \pi) = \text{undefined}$   $\pi > 1$

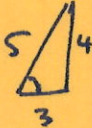
f.  $\cos^{-1}(-\frac{\sqrt{2}}{2}) = \frac{3\pi}{4}$

g.  $\cos^{-1}(0) = \frac{\pi}{2}$

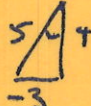
h.  $\cos^{-1}(\cos \frac{4\pi}{3}) = \frac{4\pi}{3}$

i.  $\tan^{-1}(\tan(-\frac{\pi}{3})) = -\frac{\pi}{3}$

j.  $\cos(\cos^{-1} 0.57) = 0.57$

3. a.  $\cos(\sin^{-1} \frac{4}{5}) = \frac{3}{5}$  

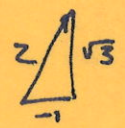
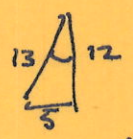
b.  $\sin(\cos^{-1}(\frac{\sqrt{2}}{2})) = \frac{\sqrt{2}}{2}$

c.  $\sin(\tan^{-1}(-\frac{3}{4})) = -\frac{3}{5}$  

d.  $\cot(\sin^{-1} \frac{5}{13}) = \frac{12}{5}$

e.  $\sec(\sin^{-1}(-\frac{1}{2})) = -\frac{2}{\sqrt{3}}$

f.  $\csc(\cos^{-1}(-\frac{\sqrt{3}}{2})) = -2$

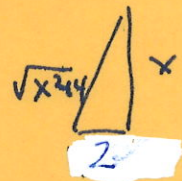
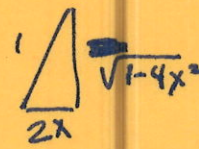
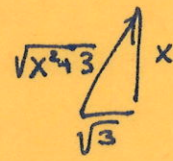
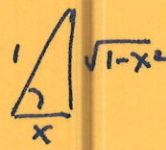


4. a.  $\tan(\cos^{-1} x) = \frac{\sqrt{1-x^2}}{x}$

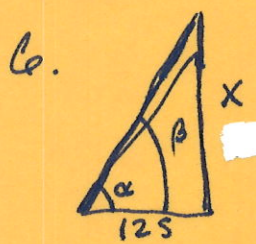
b.  $\cot(\tan^{-1}(\frac{x}{\sqrt{3}})) = \frac{\sqrt{3}}{x}$

c.  $\sin(\cos^{-1} 2x) = \frac{\sqrt{1-4x^2}}{2x}$

d.  $\sec(\sin^{-1}(\frac{x}{\sqrt{x^2+4}})) = \frac{\sqrt{x^2+4}}{2}$



5. See attached



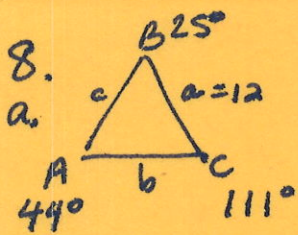
$\alpha = 19.2^\circ, \beta = 36.7^\circ$

$\frac{x_1}{125} = \sin \alpha \Rightarrow x_1 = 125 \sin(19.2) \approx 41.1 \text{ ft}$

$\frac{x_2}{125} = \sin \beta \Rightarrow x_2 = 125 \sin(36.7) \approx 65.7 \text{ ft}$

$65.7 - 41.1 = 24.6 \text{ ft increase}$

7. a. N  $70^\circ$  E  
 b. S  $35^\circ$  E  
 c. S  $15^\circ$  W  
 d. N  $80^\circ$  W

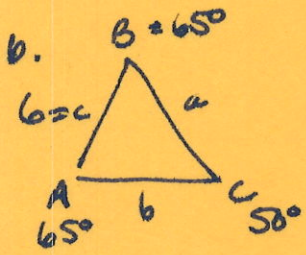


$$\frac{\sin 44^\circ}{12} = \frac{\sin 25^\circ}{b}$$

$$12 \frac{\sin 25^\circ}{\sin 44^\circ} = b = 7.3$$

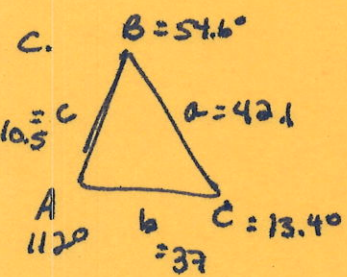
$$\frac{\sin 44^\circ}{12} = \frac{\sin 111^\circ}{c}$$

$$12 \frac{\sin 111^\circ}{\sin 44^\circ} = c = 16.1$$



$$\frac{\sin 50^\circ}{b} = \frac{\sin 65^\circ}{a}$$

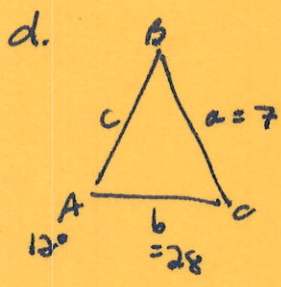
$$b \frac{\sin 65^\circ}{\sin 50^\circ} = a = 7.1 = b$$



$$\frac{\sin 112^\circ}{42.1} = \frac{\sin B}{37} \Rightarrow \sin B = \frac{37 \sin 112^\circ}{42.1} \quad B = 54.6^\circ$$

$$\frac{\sin 13.4^\circ}{c} = \frac{\sin 112^\circ}{42.1}$$

$$c = \frac{42.1 \sin 13.4^\circ}{\sin 112^\circ} = 10.5$$



$$\frac{\sin 12^\circ}{7} = \frac{\sin B}{28} \Rightarrow \frac{28 \sin 12^\circ}{7} = \sin B \quad B = 56.3^\circ$$

$$B = 123.7^\circ$$

if  $B = 56.3^\circ$   
 $C = 111.7^\circ$

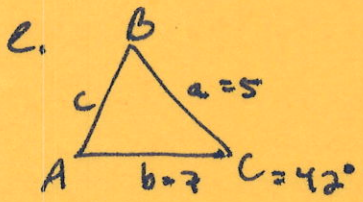
if  $B = 123.7^\circ$   
 $C = 44.3^\circ$

$$\frac{\sin 111.7^\circ}{c} = \frac{\sin 12^\circ}{7}$$

$$7 \frac{\sin 111.7^\circ}{\sin 12^\circ} = c = 31.28$$

$$\frac{\sin 44.3^\circ}{c} = \frac{\sin 12^\circ}{7}$$

$$7 \frac{\sin 44.3^\circ}{\sin 12^\circ} = c = 23.51$$



$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$c^2 = 5^2 + 7^2 - 70 \cos 42^\circ = 21.98 \quad c = 4.69 \approx 4.7$$

$$\frac{\sin 42^\circ}{4.7} = \frac{\sin B}{7} \quad \sin B = \frac{7 \sin 42^\circ}{4.7} \quad B = 85.3^\circ$$

$$C = 52.7^\circ$$