


Key - Practice Problems for the Final

①

1. a)  d) $\sin \theta = -\frac{1}{2}$ $\cos \theta = -\frac{\sqrt{3}}{2}$ $\tan \theta = \frac{\sqrt{3}}{3}$
b) $\theta' = \pi/6$ $\csc \theta = -2$ $\sec \theta = -\frac{2\sqrt{3}}{3}$ $\cot \theta = \sqrt{3}$
c) 210°

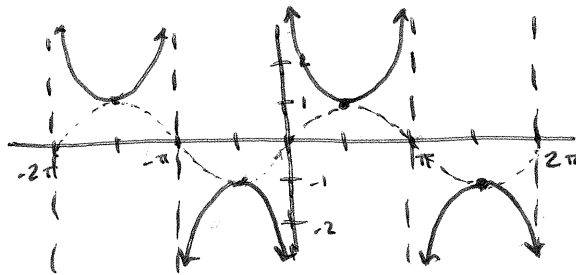
2. a) -50° b) $31\pi/18$

3. $\sin u = -\frac{2\sqrt{13}}{13}$, $\cos u = -\frac{3\sqrt{13}}{13}$

4. $\sin^2 \theta + (1/3)^2 = 1$
 $\sin^2 \theta = 1 - 1/9$
 $\sin^2 \theta = 8/9$ \rightarrow $\sin \theta = \pm \sqrt{8/9}$
 $\sin \theta = 2\sqrt{2}/3$

5. a) Amp = 2 c) Phase Shift = $-\pi/3$
b) Period = $2\pi/3$ d) Vertical Shift = 3

6. $y = \csc x$
Period = 2π
Asymptotes: $x = \pi k$



7. $\frac{25}{\tan 52} \approx 19.532 \text{ ft}$

8. $A = 108\pi \approx 339.292 \text{ in}^2$

9. a) $3\pi/4$ b) $\sqrt{5}/3$

10. $x = \pi/4, 7\pi/4$

$$11. X = \frac{\pi}{18} + \frac{k\pi}{3}$$

$$12. \beta = \sin^{-1}(1/12) \approx 4.78^\circ$$

$$13. c = \sqrt{34 + 15\sqrt{3}} \approx 7.745$$

$$14. \sin \frac{u}{2} = \frac{\sqrt{18 + 6\sqrt{5}}}{6} \quad \text{Note: decimal form is Not exact}$$

$$15. \text{ a) } \sin \frac{A}{2} = \frac{\sqrt{5}}{5} \quad \text{ b) } \tan(A+B) = 18 \quad \text{ c) } \cos 2B = \frac{5}{13}$$

$$16. \frac{\sqrt{2} - \sqrt{6}}{4} \quad \text{or} \quad \frac{-\sqrt{2 - \sqrt{3}}}{2} \quad \text{Note again: decimal form is Not exact}$$

$$17. S 45^\circ W \quad \text{or} \quad 225^\circ$$

$$18. \text{ Verify } \frac{1}{\sec x \tan x} = \csc x - \sin x$$

$$\frac{\cos x}{\frac{\sin x}{\cos x}}$$

$$\frac{\cos^2 x}{\sin x}$$

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

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

$$\csc x - \sin x \quad \checkmark$$

Note: this is only one possible way to verify

$$19. \text{ a) } \|\vec{A}\| = \sqrt{13}, \quad \theta = \tan^{-1}(-\frac{2}{3}) = -33.69^\circ \text{ or } 326.31^\circ$$

$$\text{ b) } \langle -4, -2 \rangle$$

$$\text{ c) } 5$$

$$\text{ d) } \cos^{-1}\left(\frac{5}{\sqrt{13} \cdot \sqrt{17}}\right) \approx 70.346^\circ$$

$$20. \quad 1000 \sin 40 \approx 642.788 \text{ lbs}$$

$$21. \quad \text{Speed: } 239.259 \text{ mph}$$

$$\text{Bearing: } 47.176^\circ$$

$$22. \quad A = 60 \sin 22^\circ \approx 22.476 \text{ ft}^2$$

$$23. \quad \text{a) } z_1 = 5(\cos 323.1301^\circ + i \sin 323.1301^\circ)$$

$$z_2 = 3\sqrt{2}(\cos 45^\circ + i \sin 45^\circ)$$

$$\text{b) } z_1 \cdot z_2 = 15\sqrt{2}(\cos 8.1301^\circ + i \sin 8.1301^\circ)$$

$$= 21 + 3i$$

$$z_2/z_1 = \frac{3\sqrt{2}}{5}(\cos 81.8699^\circ + i \sin 81.8699^\circ)$$

$$= \frac{3}{25} + \frac{21}{25}i$$

$$\text{c) } z_1^4 = 625(\cos 212.5204^\circ + i \sin 212.5204^\circ)$$

$$= -527 - 336i$$

d) 3rd Roots of z_2

$$\sqrt[3]{3\sqrt{2}}(\cos 15^\circ + i \sin 15^\circ)$$

$$\sqrt[3]{3\sqrt{2}}(\cos 135^\circ + i \sin 135^\circ)$$

$$\sqrt[3]{3\sqrt{2}}(\cos 255^\circ + i \sin 255^\circ)$$

$$24. \quad r = -5 \sin \theta$$

25. a) $(6, \pi/4) \rightarrow (3\sqrt{2}, 3\sqrt{2})$
 $(-4, \pi/4) \rightarrow (-2\sqrt{3}, -2)$

b) $(-3, 3) \rightarrow (3\sqrt{2}, 3\pi/4)$
 $(1, -\sqrt{3}) \rightarrow (2, 5\pi/3)$

c) $(3, \pi/3)$

possible answers include:

$(3, 7\pi/3), (3, -5\pi/3), (-3, 4\pi/3), (-3, -2\pi/3), (3, 13\pi/3)$

