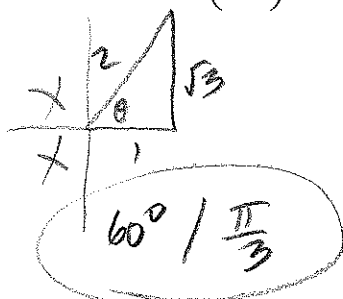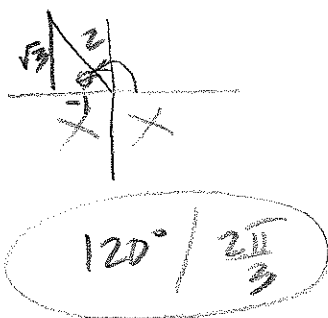## Sections 4.7-4.8 – I.C.E.

For 1-9, evaluate without using a calculator. Give answer in both degrees and radians.
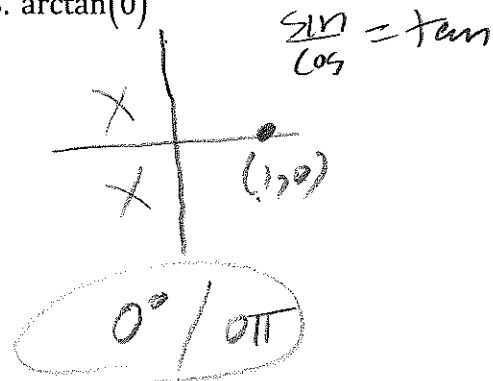
1. $\arcsin\left(\dfrac{\sqrt{3}}{2}\right)$
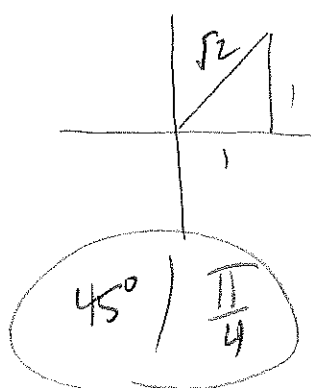
$\boxed{60° \ / \ \dfrac{\pi}{3}}$

2. $\arccos\left(-\dfrac{1}{2}\right)$

$\boxed{120° \ / \ \dfrac{2\pi}{3}}$

3. $\arctan(0)$

$\dfrac{\sin}{\cos} = \tan$

$(1, 0)$

$\boxed{0° \ / \ 0\pi}$

4. $\cos^{-1}\left(\dfrac{\sqrt{2}}{2}\right)$

$\boxed{45° \ / \ \dfrac{\pi}{4}}$

5. $\sin^{-1}\left(-\dfrac{\sqrt{2}}{2}\right)$

$\boxed{-45° \ / \ -\dfrac{\pi}{4}}$

6. $\tan^{-1}\left(\sqrt{3}\right)$

$\boxed{60° \ / \ \dfrac{\pi}{3}}$

7. $\arcsin(1)$

$(0, 1)$

$\boxed{90° \ / \ \dfrac{\pi}{2}}$

8. $\arctan(-1)$

$\boxed{-45° \ / \ -\dfrac{\pi}{4}}$

9. $\cos^{-1}(-1)$

$(-1, 0)$

$\boxed{180° \ / \ \pi}$
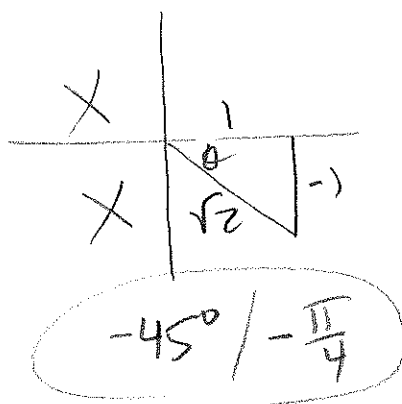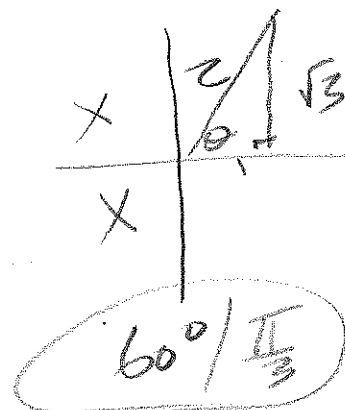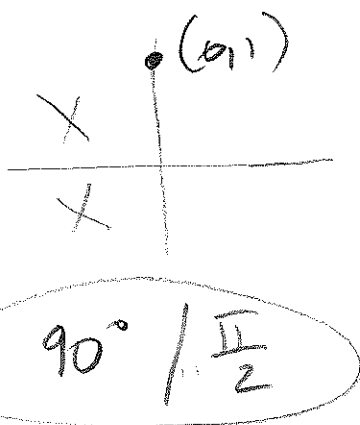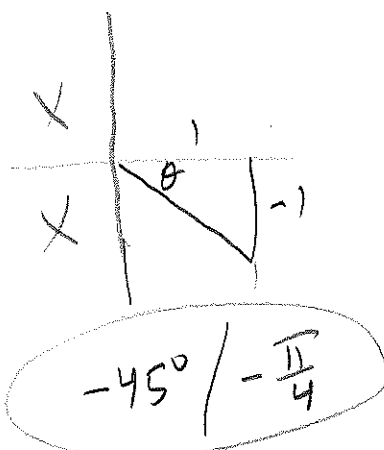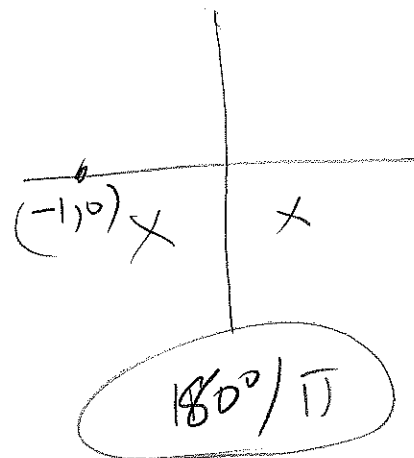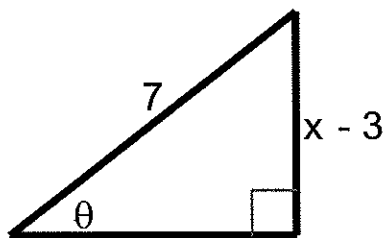
Sections 4.7–4.8 – I.C.E.

10. Use an inverse function to write θ as a function of x.

$$\sin \theta = \frac{x-3}{7}$$

$$\theta = \sin^{-1}\left(\frac{x-3}{7}\right)$$
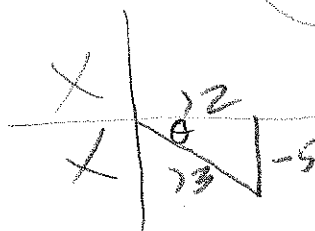
θ = _____

For 11-14, find the exact value of the expression without using a calculator.
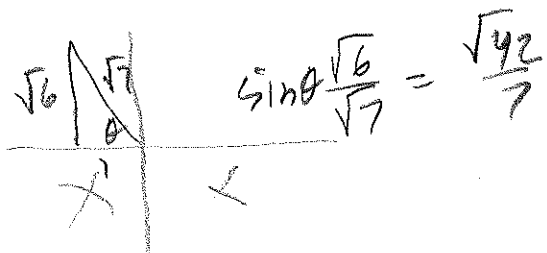
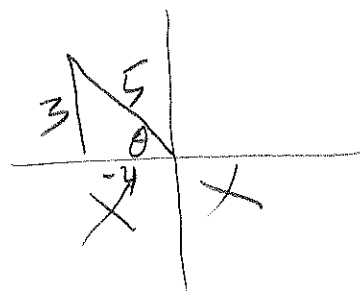11. $\cos\left(\arctan\left(\frac{3}{4}\right)\right) = \frac{4}{5}$
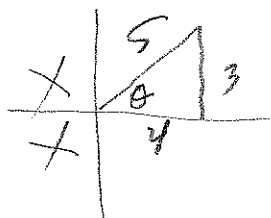
12. $\sec\left(\sin^{-1}\left(-\frac{5}{13}\right)\right) = \frac{13}{12}$

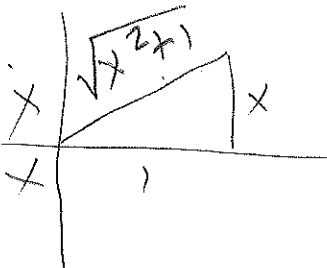13. $\sin\left(\cos^{-1}\left(\frac{\sqrt{7}}{7}\right)\right) = \frac{\sqrt{42}}{7}$

$\sin\theta \frac{\sqrt{6}}{\sqrt{7}} = \frac{\sqrt{42}}{7}$

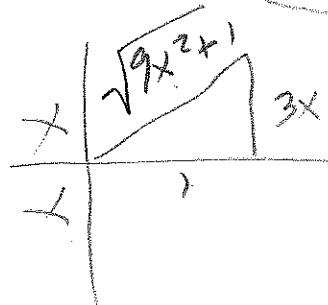14. $\cot\left(\arccos\left(-\frac{4}{5}\right)\right) = -\frac{4}{3}$

Sections 4.7-4.8 – I.C.E.

For 15-18, write an algebraic expression that is equivalent to the given expression (no calculator!!).

15. $\sin(\arctan(x))$ $= \dfrac{x}{\sqrt{x^2+1}}$

16. $\sec(\arctan(3x))$ $= \sqrt{9x^2+1}$

17. $\cot\left(\arctan\left(\dfrac{1}{x}\right)\right) = \dfrac{x}{1}$
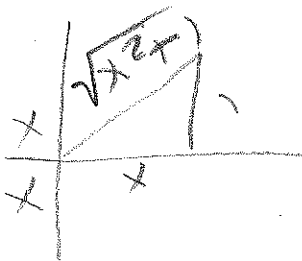
18. $\sec(\arcsin(2x))$ $= \dfrac{1}{\sqrt{1-4x^2}}$
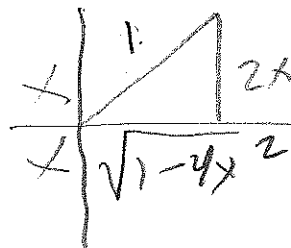
19. Keeping in mind the restricted domains, find the values of the following:

a) $\sin\left(\sin^{-1}\left(\dfrac{1}{3}\right)\right) = \dfrac{1}{3}$

b) $\cos^{-1}\left(\cos\left(\dfrac{-7\pi}{6}\right)\right) = \cos^{-1}\left(-\dfrac{\sqrt{3}}{2}\right) = 150° / \dfrac{5\pi}{6}$
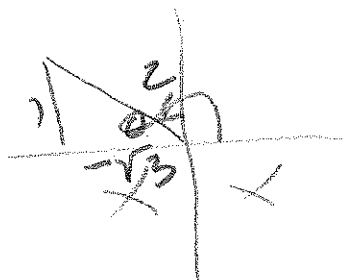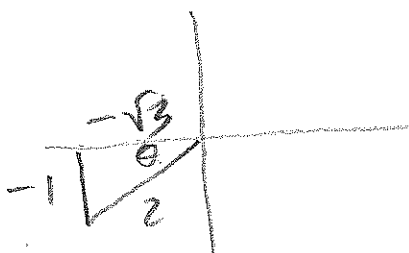
Sections 4.7-4.8 – I.C.E.

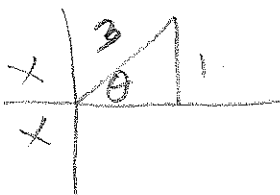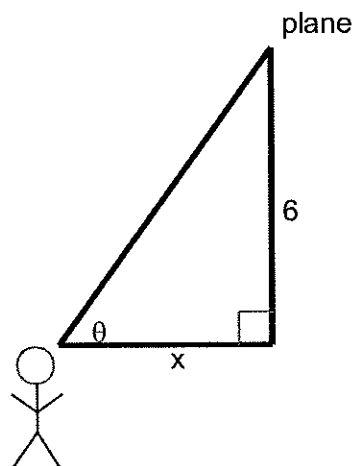**For questions 20-27, you can use a calculator!!**

20. An airplane flies at an altitude of 6 miles toward a point directly over an observer. Drawing is not to scale

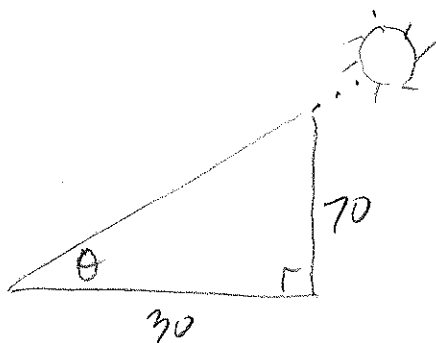   a) Write θ as a function of x.

    $$\theta = \underline{\tan^{-1}\left(\frac{6}{x}\right)}$$

    b) Find θ when x = 9 miles.

    $$\theta = \underline{\tan^{-1}\left(\frac{6}{9}\right)} \approx \boxed{33.69^{\circ}}$$

    plane

    6

    θ

    x

21. The height of a radio transmission tower is 70 meters, and it casts a shadow of length 30 meters. Find the angle of elevation the sun.

    $$\tan\theta = \frac{70}{30} = \frac{7}{3}$$

    $$\theta = \tan^{-1}\left(\frac{7}{3}\right) \approx 66.80^{\circ}$$

    70

    θ

    30

22. Standish throws a baseball such that it landed at the edge of the roof of the school building. When he is 25 feet from the base of the building, the angle of elevation to his baseball is 21°. How high off the ground is Standish's baseball?

    $$\tan 21^{\circ} = \frac{x}{25}$$

    $$x = 25\tan 21^{\circ} \approx 9.6\text{ ft}.$$

    21°

    25
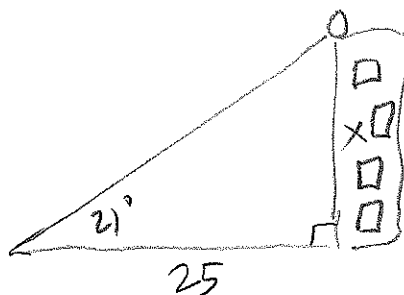
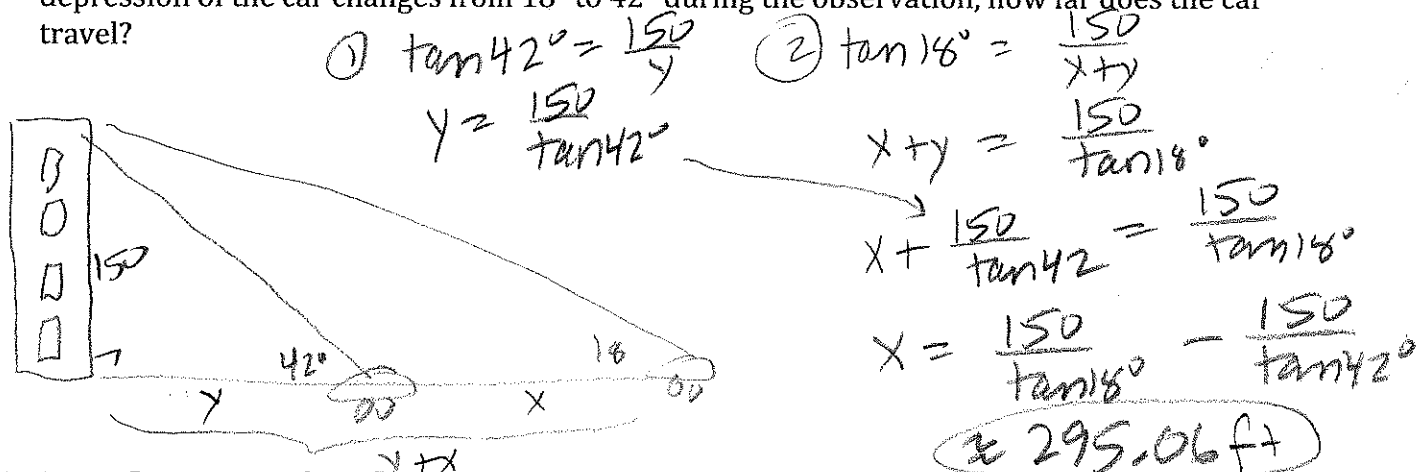23. From the top of a 150 ft. building Samantha observes a car moving toward her. If the angle of depression of the car changes from 18° to 42° during the observation, how far does the car travel?

① $\tan 42° = \dfrac{150}{y}$ ② $\tan 18° = \dfrac{150}{x+y}$

$y = \dfrac{150}{\tan 42°}$

$x+y = \dfrac{150}{\tan 18°}$

$x + \dfrac{150}{\tan 42} = \dfrac{150}{\tan 18°}$

$x = \dfrac{150}{\tan 18°} - \dfrac{150}{\tan 42°}$

$\approx 295.06 \text{ ft}$

24. Zoe is flying an airplane flying at 600 mph at a bearing of 52°. After flying for 1.5 hours, how far north and how far east will the plane have traveled from its point of departure?
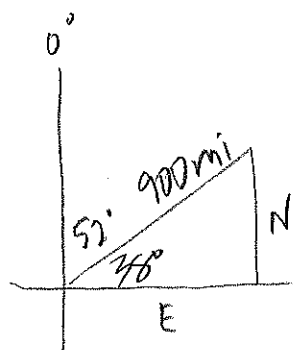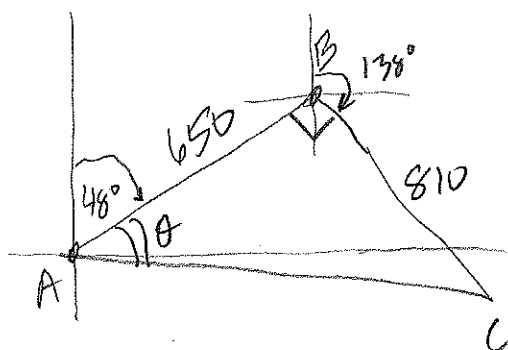
$\sin 38° = \dfrac{N}{900}$ $\cos 38° = \dfrac{E}{900}$

$N = 554.10 \text{ mi}$ $E = 709.21 \text{ mi}$

25. From city A to city B, Ben flies an airplane 650 miles at a bearing of 48°. From city B to city C, the plane flies 810 miles at a bearing of 138° degrees. Find the distance from city A to city C and the bearing from city A to city C.

$138° - 48° = 90°$ $\tan\theta = \dfrac{810}{650}$

$650^2 + 810^2 = AC^2$ $\theta = \tan^{-1}\left(\dfrac{81}{65}\right)$

$AC = 1038.56 \text{ mi}$ $\approx 51.25°$

Bearing $= 48° + \theta$

$= 99.25°$

– OR –

$S\ 80.75°\ E$

BE SURE you also do the extensive word problem review packet given out in class.
AND redo problems from section 4.7 that we did in the notes and in homework questions.