

Week in Review # 11

MATH 150

7.1 through 7.7

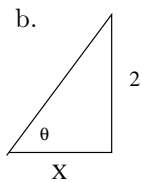
Drost-Fall 2002

1. Evaluate:

a. $\arcsin(\frac{\sqrt{2}}{2})$

b. $\arctan \sqrt{5}$

2. Write θ as a function of x :



Find the exact value of each of the following:

3. $\cos(\arcsin \frac{5}{13})$

4. $\csc(\arctan \frac{-5}{12})$

5. $\cot(\arctan \frac{5}{8})$

6. $\sec[\arcsin(x-1)]$

7. An observer at point A sees a weather balloon at an angle θ of elevation. The balloon (B) is 500' above point C.

a. Express the distance x to the balloon as a function of θ .

b. Find the distance if the angle of elevation is 26° .

8. Solve the right triangle ABC given $A = 8.4^\circ$ and $a = 40.5$.

9. From a point 100' in front of a public library, the angle of elevation to the base of the flagpole and the top of the flagpole are 26° and $40^\circ 10'$. The flagpole is mounted on the front of the library's roof. Find the height of the pole.

10. A surveyor wishes to find the distance to point B across a lake. The bearing from point A to point B is $N28^\circ W$. The surveyor then walks on a path with bearing $N62^\circ E$ a distance of 80 meters to point C. At point C the bearing to point B is $N74^\circ W$. Find the distance from A to B.

11. Simplify each of the following to an expression containing a single trig function with no denominator:

a. $\cot x \cdot \sin x$

b. $\frac{\sin(\frac{\pi}{2} - x)}{\cos(\frac{\pi}{2} - x)}$

c. $(\cos^2 x)(\sec^2 x - 1)$

d. $\cos x \cdot \tan x$

e. $\frac{1}{\tan^2 x + 1}$

f. $\sin^2 x \csc^2 x - \sin^2 x$

g. $\cos(x - \frac{\pi}{2}) \csc x$

12. Rewrite not in fractional form:

a. $\frac{5}{\tan x + \sec x}$

b. $\frac{3}{\sec x - \tan x}$

13. Simplify the expression:

a. $\frac{\csc(-\alpha)}{\sec(-\alpha)}$

b. $\frac{\tan x + \cot y}{\tan x \cdot \cot y}$

c. $(1 + \sin x)(1 + \sin(-x))$

d. $\sec^2(\frac{\pi}{2} - x) - 1$

e. $\frac{\tan^3 \alpha - 1}{\tan \alpha - 1}$

14. Verify: $\frac{\sin \beta}{1 - \cos \beta} = \frac{1 + \cos \beta}{\sin \beta}$

15. Simplify:

a. $\frac{1}{\cot x + 1} + \frac{1}{\tan x + 1}$

b. $\sin t + \frac{\cot^2 t}{\csc t}$

c. $\cos^2 37^\circ + \cos^2 53^\circ$

d. $\sin^2 12^\circ + \sin^2 40^\circ + \sin^2 50^\circ + \sin^2 78^\circ$

16. Solve the equation:

a. $\csc^2 x - 2 = 0$

b. $\sin^2 x + \sin x = 0$

c. $\sec^2 x = 2 + \sec x$

d. $\cos x + \sin x \cdot \tan x = 2$

17. Find the exact value:

a. $\sin(\frac{3\pi}{4}) + \sin(\frac{5\pi}{6})$

b. $\sin(\frac{3\pi}{4} + \frac{5\pi}{6})$

c. $\sin(105^\circ)$

d. $\cos(255^\circ)$

e. $\tan(\frac{-\pi}{12})$

f. $\sin(\arcsin x + \arctan x)$

18. Simplify each of the following:
- $\sin 140^\circ \cos 50^\circ + \cos 140^\circ \sin 50^\circ$
 - $\cos \nabla \cos \Delta - \sin \nabla \sin \Delta$
 - $\frac{\tan 15^\circ - \tan 20^\circ}{1 + \tan 15^\circ \tan 20^\circ}$
 - $\cos 2x \sin 3y + \sin 2x \cos 3y$

19. Given: $\sin u = \frac{12}{13}$ and $0 < u < \frac{\pi}{2}$
and $\cos v = \frac{-3}{5}$ and $\frac{\pi}{2} < v < \pi$
- find the exact value of $\sin(u + v)$
 - find the exact value of $\cos(u - v)$
20. Given: $\cos(v) = \frac{12}{13}$ and $0 < v < \frac{\pi}{2}$
and $\sin(u + v) = \frac{1}{2}$ and $\frac{\pi}{2} < u + v < \pi$
find the exact value of $\sin(u)$

Given \overrightarrow{PQ} and \overrightarrow{RS} where $P = (2, 5)$, $Q = (-3, 2)$,
 $R = (-4, 1)$ and $S = (8, 2)$

21. Find the component form and magnitude of \overrightarrow{PQ}
and \overrightarrow{RS} .

22. Given: $\vec{u} = \langle 2, -2 \rangle$, $\vec{v} = \langle 4, 3 \rangle$ and
 $\vec{w} = \langle 3, -4 \rangle$

- Find $\vec{u} + \vec{v}$
- Find $\vec{u} - 2\vec{v}$
- Find the direction angle of \vec{w}

- 23a. Find the component form of \vec{u} given its magnitude is 7 and the angle it makes with the positive x axis is 37° .

- 23b. Find the component form of \vec{v} given its magnitude is 4 and the angle it makes with the positive x axis is 120° .

24. Find the angle between a force of 100 pounds and a force of 150 pounds if the resultant force is 135 pounds.

25. A hiker travels 20 miles $N40^\circ E$, then changes course to $S20^\circ E$, and walks another 10 miles. What is her distance from the starting point?

- 25b. What bearing should she use to walk back to camp?

Given right triangle ABC with $a=12$ and $b=5$. Find the exact value of:

- $\cos 2A$
- $\tan 2A$
- $\sin 2A$
- $\cos \frac{A}{2}$
- $\sin \frac{A}{2}$

31. Given $\sin u \cdot \cos v = \frac{1}{2}[\sin(u + v) + \sin(u - v)]$,
rewrite $4 \sin \frac{\pi}{3} \cos \frac{5\pi}{6}$ as a sum or difference.

32. Verify the identity: $\sec 2\theta = \frac{\sec^2 \theta}{2 - \sec^2 \theta}$

33. Solve the triangle ABC given: $A = 60^\circ$, $a = 9$,
and $c = 10$.

34. Find a value for b such that the triangle ABC
with $A = 60^\circ$ and $a = 10$ has

- 1 solution
- 2 solutions
- 3 solutions

ANSWERS:

- $\frac{\pi}{4}, \beta = 65.91^\circ$
- $\theta = \arcsin(\frac{x+3}{4}), \theta = \arctan \frac{2}{x}$
- $\frac{12}{13}$
- $\frac{-13}{5}$
- $\frac{8}{5}$
- $\frac{\sqrt{2x-x^2}}{2x-x^2}$
- a. $\frac{500}{\sin \theta}$, b. 1140 ft.
- angle B = 81.6° , $b \approx 274.3$
- 35.6 ft
- 77 meters
- a. $\cos x$, b. $\cot x$, c. $\sin^2 x$, d. $\sin x$,
e. $\cos^2 x$, f. $\cos^2 x$, g. 1
- a. $-5 \tan x + 5 \sec x$, b. $3 \sec x + 3 \tan x$
- a. $-\cot \alpha$, b. $\tan y + \cot x$, c. $\cos^2 x$
d. $\cot^2 x$, e. $\tan \alpha + \sec^2 \alpha$
- a. 1, b. $\csc t$, c. 1, d. 2
- a. $\frac{\pi}{4} + \pi n, \frac{3\pi}{4} + \pi n$
- b. $x = 0 + 2\pi n, \pi + 2\pi n, \frac{3}{2}\pi + 2\pi n$
- c. $x = \frac{\pi}{3} + 2\pi n, \frac{5\pi}{3} + 2\pi n, \pi + 2\pi n$
- d. $x = \frac{\pi}{3} + 2\pi n, \frac{5\pi}{3} + 2\pi n$
- a. $\frac{1+\sqrt{2}}{2}$, b. $-\frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4}$, c. $\frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4}$, d.
 $-\frac{\sqrt{6}}{4} + \frac{\sqrt{2}}{4}$
- e. $\frac{\sqrt{3}-3}{3+\sqrt{3}}$ or $\sqrt{3} - 2$
- a. $\sin 190^\circ$, b. $\cos(\nabla + \Delta)$, c. $-\tan 5^\circ$,

18d. $\sin(3y + 2x)$

19a. $\frac{-16}{65}$, b. $\frac{33}{65}$

20. $\frac{6}{13} + \frac{5\sqrt{3}}{26}$

21. $\vec{PQ} = \langle -5, -3 \rangle$, $\|\vec{PQ}\| = \sqrt{34}$
 $\vec{RS} = \langle 12, 1 \rangle$, $\|\vec{RS}\| = \sqrt{145}$

22a. $\langle 6, 1 \rangle$, b. $\langle -6, -8 \rangle$, c. 306.87°

23a. $\mathbf{u} = \langle 7 \cos 37^\circ, 7 \sin 37^\circ \rangle$, b. $\mathbf{v} = \langle -2, 2\sqrt{3} \rangle$

24. $\theta = 118.4^\circ$

25a. 17.3 miles, b. $S70^\circ W$

26. $\frac{-119}{169}$

27. $\frac{-120}{119}$

28. $\frac{120}{169}$

29. $\frac{3\sqrt{13}}{13}$

30. $\frac{2\sqrt{13}}{13}$

31. -3

32. $\sec 2\theta$

33. $\triangle_1 : A = 60^\circ, B = 45.8^\circ, C = 74.2^\circ$
 $a = 9, b = 7.45, c = 10$

33. $\triangle_2 : A = 60^\circ, B = 14.2^\circ, C = 105.8^\circ$
 $a = 9, b = 2.55, c = 10$

34. a. $b \approx 11.547, b. 11.547 > b > 10, c. b > 11.547$