2017-18

PreCalculus
WS: Chapter 4, Part I Review

Name Key
Date 11/27 Block 1A, 2B
11/28

For 1 – 2, do the following:

a.) Sketch the angle.
b.) Identify the quadrant in which the angle lies.
c.) Find one positive and one negative angle coterminal with the given angle.
d.) Identify the reference angle.
e.) Identify the coordinate point on the unit circle that corresponds to the given angle.
f.) Evaluate the six trigonometric functions of the given angle.

1. $\theta = \frac{11\pi}{3}$

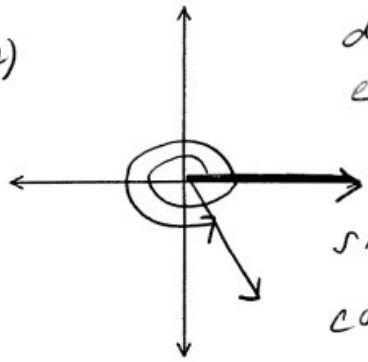
b) IV

c) $-\frac{\pi}{3}, \frac{5\pi}{3}$

d) $\frac{\pi}{3}$

e) $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

a)



f)

$\sin\frac{11\pi}{3} = -\frac{\sqrt{3}}{2}$ $\quad \csc\frac{11\pi}{3} = -\frac{2\sqrt{3}}{3}$

$\cos\frac{11\pi}{3} = \frac{1}{2}$ $\quad \sec\frac{11\pi}{3} = 2$

$\tan\frac{11\pi}{3} = -\sqrt{3}$ $\quad \cot\frac{11\pi}{3} = -\frac{\sqrt{3}}{3}$

2. $\theta = -\frac{23\pi}{4}$

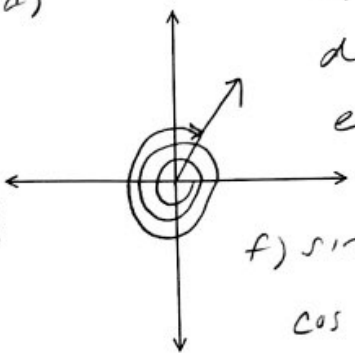
b) I

c) $\frac{\pi}{4}, -\frac{7\pi}{4}$

d) $\frac{\pi}{4}$

e) $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$

a)



f) $\sin\left(-\frac{23\pi}{4}\right) = \frac{\sqrt{2}}{2}$

$\cos\left(-\frac{23\pi}{4}\right) = \frac{\sqrt{2}}{2}$

$\tan\left(-\frac{23\pi}{4}\right) = 1$

$\csc\left(-\frac{23\pi}{4}\right) = \sqrt{2}$

$\sec\left(-\frac{23\pi}{4}\right) = \sqrt{2}$

$\cot\left(-\frac{23\pi}{4}\right) = 1$

In 3 – 6, find the exact value of each trigonometric function <u>without a</u> calculator!

3. $\sin\frac{\pi}{2} = 1$

4. $\tan\frac{7\pi}{4} = -1$

5. $\cos\left(-\frac{7\pi}{6}\right) = -\frac{\sqrt{3}}{2}$

6. $\sec\frac{17\pi}{3} = 2$

In 7 - 8, identify any coterminal angles.

7. $150°, 510°, -210°, 450°, 870°$

8. $\frac{5\pi}{3}, -\frac{5\pi}{3}, \frac{11\pi}{3}, -\frac{7\pi}{3}, \frac{365\pi}{3}$

In 9 - 10, find (if possible) the complement and supplement of each angle.

9. $\theta = \frac{7\pi}{11}$ no complement; supplement: $\frac{4\pi}{11}$

10. $\theta = \frac{9\pi}{20}$ complement: $\frac{\pi}{20}$; supplement: $\frac{11\pi}{20}$

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In 11 - 12, express each of the following in degree measure.

11. $\theta = \frac{3\pi}{8} \cdot \frac{180^\circ}{\pi} = \frac{540^\circ}{8} = 67.5^\circ$

12. $\theta = -\frac{10\pi}{9} \cdot \frac{180^\circ}{\pi} = -200^\circ$

In 13 - 14, express each of the following in radian measure. Leave your answer in terms of π.

13. $375^\circ \cdot \frac{\pi}{180^\circ} = \frac{25\pi}{12}$

14. $-140^\circ \cdot \frac{\pi}{180^\circ} = -\frac{7\pi}{9}$

In 15 - 16, identify *two different* angles that satisfy the given condition. Your answers can be in radians (in terms of π) or degrees.

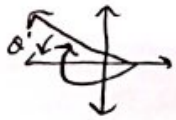
15. $\cos\theta = \frac{\sqrt{3}}{2}$ $\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$ $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

$\frac{\pi}{6}, \frac{11\pi}{6}$ $(30^\circ, 330^\circ)$

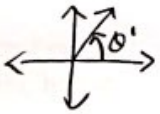
16. $\sin\theta = 0$ $0, \pi$ $(0^\circ, 180^\circ)$

In 17 - 19, find the reference angle for each angle.

17. -217° 37°



18. $\frac{3\pi}{7}$ $\frac{3\pi}{7}$



19. $-\frac{5\pi}{9}$ $\frac{4\pi}{9}$

In 20 - 21, round answers to the nearest hundredth.

20. The wheel of a machine rotates at the rate of 300 rpm (revolutions per minute). If the diameter of the wheel is 80 cm, what are the angular (in radian per second) and linear speed (in cm per second) of a point on the wheel?

Angular

$\frac{300 \text{ rev}}{\text{min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{2\pi \text{ rad}}{1 \text{ rev}} = 10\pi \text{ or } 31.42 \text{ radians/sec}$

Linear

$\frac{300 \text{ rev}}{\text{min}} \cdot \frac{80\pi \text{ cm}}{1 \text{ rev}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = 400\pi \text{ or } 1256.64 \text{ cm/sec}$

21. The Earth rotates about its axis once every 24 hours (approximately). The radius R of the equator is approximately 4000 miles. Find the angular (radians / second) and linear (feet / second) speed of a point on the equator.

Angular

$\frac{1 \text{ rotation}}{24 \text{ hr}} \cdot \frac{2\pi \text{ rad}}{1 \text{ rot}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = 0.0000727 \text{ rad/sec}$

Linear

$\frac{1 \text{ rotation}}{24 \text{ hr}} \cdot \frac{1 \text{ hr}}{3600 \text{ sec}} \cdot \frac{8000\pi \text{ mi}}{1 \text{ rot}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}}$

1535.89 ft/sec

In 22 - 25, use a calculator to evaluate the trigonometric functions. Round your answers to four decimal places.

22. $\tan 33^\circ$ 0.6494

23. $\csc 11^\circ = \frac{1}{\sin 11^\circ}$ 5.2408

24. $\sec\frac{12\pi}{5} = \frac{1}{\cos\left(\frac{12\pi}{5}\right)}$ 3.2361

25. $\sin\left(-\frac{\pi}{9}\right)$ -0.3420

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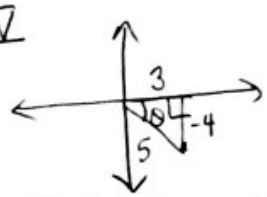
The point is on the terminal side of an angle θ in standard position. Determine the exact values of the six trigonometric functions of the angle θ.

26. $(3, -4)$

QIV



$\sin\theta = -\frac{4}{5}$ $\quad \csc\theta = -\frac{5}{4}$

$\cos\theta = \frac{3}{5}$ $\quad \sec\theta = \frac{5}{3}$

$\tan\theta = -\frac{4}{3}$ $\quad \cot\theta = -\frac{3}{4}$

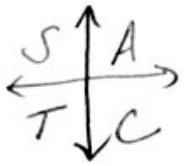
In 27 – 30, state the quadrant in which θ lies.

27. $\tan\theta > 0$ *and* $\cos\theta < 0$ — III

28. $\csc\theta > 0$ *and* $\tan\theta < 0$ — II

29. $\sec\theta > 0$ *and* $\tan\theta > 0$ — I

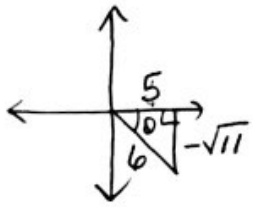
30. $\sec\theta < 0$ *and* $\tan\theta > 0$ — III



EXACT!

In 31 - 32, find the values of the six trigonometric functions of θ satisfying the given conditions.

31. $\sec\theta = \frac{6}{5}$ *and* $\tan\theta < 0$, QIV

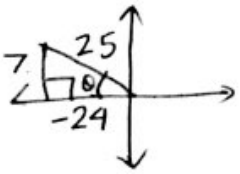


$\sin\theta = -\frac{\sqrt{11}}{6}$ $\quad \csc\theta = -\frac{6\sqrt{11}}{11}$

$\cos\theta = \frac{5}{6}$ $\quad \sec\theta = \frac{6}{5}$

$\tan\theta = -\frac{\sqrt{11}}{5}$ $\quad \cot\theta = -\frac{5\sqrt{11}}{11}$

32. $\tan\theta = -\frac{7}{24}$ *and* $\sin\theta > 0$, QII



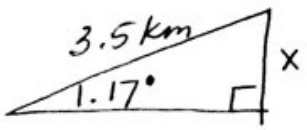
$\sin\theta = \frac{7}{25}$ $\quad \csc\theta = \frac{25}{7}$

$\cos\theta = \frac{-24}{25}$ $\quad \sec\theta = \frac{-25}{24}$

$\tan\theta = -\frac{7}{24}$ $\quad \cot\theta = \frac{-24}{7}$

In 33 – 38, round to the nearest hundredth.

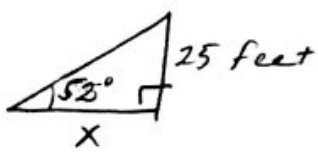
33. A train travels 3.5 kilometers on a straight track with a grade of 1.17°. What is the vertical rise of the train in that distance?



$\sin 1.17° = \frac{x}{3.5}$

$x = 3.5 \sin 1.17 = 0.07$ km

34. A guy wire runs from the ground to the top of a 25-foot pole. The angle formed between the wire and the ground is 52 degrees. How far from the base of the pole is the wire attached to the ground?



$\tan 52° = \frac{25}{x}$

$x = \frac{25}{\tan 52°} = 19.53$ ft

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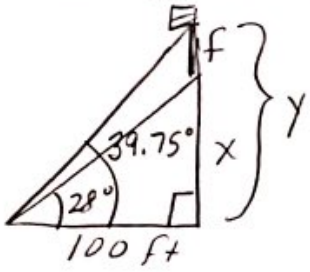
35. From a point 100 feet in front of the public library, the angle of elevation to the roof of the library is 28°. There is a flagpole mounted on the front of the library's roof. The angle of elevation to the top of the flagpole is 39.75°. What is the height of the flagpole?



$\tan 28^\circ = \frac{x}{100}$

$x = 100(\tan 28^\circ)$

$x = 53.17$ ft

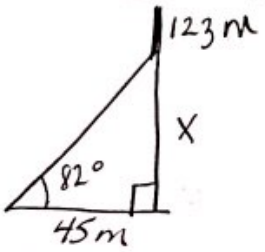
$\tan 39.75^\circ = \frac{Y}{100}$

$Y = 100 \tan 39.75^\circ$

$Y = 83.17$ ft

$f = y - x = 83.17 - 53.17 = 30$ ft

36. You are standing 45 meters from the base of the Empire State Building. You estimate that the angle of elevation to the top of the 86th floor is 82 degrees. If the total height of the building is another 123 meters above the 86th floor, what is the approximate height of the building?



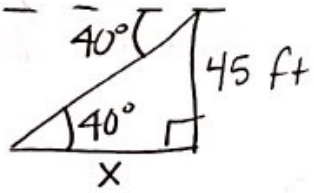
$\tan 82^\circ = \frac{x}{45}$

$x = 45 \tan 82^\circ = 320.19$ m

$h = x + 123$ m

$h = 320.19 + 123 =$ 443.19 m

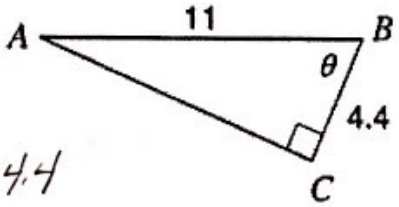
37. From the top of a fire tower, a forest ranger sees his partner on the ground at an angle of depression of 40°. If the tower is 45 feet in height, how far is the partner from the base of the tower?



$\tan 40^\circ = \frac{45}{x}$

$x = \frac{45}{\tan 40^\circ} =$ 53.63 ft

38. Solve the triangle.



$A = 23.58^\circ$ $a = 4.4$

$B = 66.42^\circ$ $b = 10.08$

$C = 90^\circ$ $c = 11$

$4.4^2 + b^2 = 11^2$

$b^2 = 11^2 - 4.4^2$

$b^2 = \sqrt{101.64}$

$b \approx 10.08$

$\cos \theta = \frac{4.4}{11}$

$\theta = \cos^{-1}\left(\frac{4.4}{11}\right)$

$\theta = 66.42^\circ$

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