Math 1060 Final Review

Find the value by drawing a reference angle (and a reference triangle when possible):

1. $\sin 60^\circ$

2. $\csc 135^\circ$

3. $\tan 120^\circ$

4. $\sec \frac{4\pi}{3}$

5. $\cot \frac{5\pi}{4}$

6. $\cos \frac{\pi}{2}$

7. $\tan \pi$

8. $\sec 270^\circ$

12. $\sin \frac{10\pi}{3}$

9. If $\sin \theta = -\frac{\sqrt{3}}{2}$ and $\cos \theta > 0$, find the value of θ in degrees and radians and the remaining trig functions.

10. Convert from radians to degrees.

a. $-\frac{3\pi}{5}$

b. $\frac{2\pi}{9}$

11. Convert from degrees to radians.

a. 320°

b. -400°

12. Find the exact value for each. (Express each answer in **radians**).

a. $\sin^{-1}\left(\frac{1}{2}\right)$

b. $\cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$

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

d. $\sin^{-1}\left(\frac{-1}{\sqrt{2}}\right)$

e. $\cot^{-1}(0)$

f. $\csc^{-1}(-1)$

13. Graph. **a.** $y = 2\sin x - 2$ **b.** $y = 3\tan\left(\frac{1}{2}x\right)$ **c.** $y = \cos(2x + \pi)$

d. $y = -\csc\left(\frac{1}{2}x + \frac{\pi}{2}\right)$ **e.** $y = 4\sec x + 1$ **f.** $y = -\cot(2\pi x)$

14. If $\sin\theta = \frac{4}{9}$ and $\tan\theta < 0$ find the remaining trig functions.

15. The terminal side of an angle passes through the point (6, –8). Find all 6 trig functions for the angle.

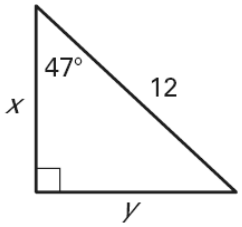
<u>Round all answers to 2 decimal places. Be sure that your calculator is in the correct mode.</u>

16. Calculate: **a.** $\sin 220^\circ$ **b.** $\csc(-100)^\circ$ **c.** $\tan\frac{2\pi}{5}$ **d.** $\sec\frac{4\pi}{7}$

17. Find each of the following in **radians**.

a. $\cos^{-1}(0.0561)$ **b.** $\tan^{-1}(-1.456)$ **c.** $\sec^{-1}(-1.589)$

18. Find ***x*** and ***y***.



19. Draw pictures and solve:

a. You are skiing on a mountain with an altitude of 1200 ft. The slope of the mountain is a 33° angle. About how far do you ski down the mountain?

b. A 16 foot ladder leans against the house and the foot of the ladder is 4 feet from the house. What angle does the ladder make with the ground? Will the ladder reach the top of a window that is 15 ft high?

c. A man in a 50 ft lighthouse sees a ship at a distance. The angle of depression to the ship is 36º. How far away is the ship from the lighthouse?

20. Find the exact value of $\tan\left[\cos^{-1}\left(\frac{-12}{13}\right)\right]$

Establish each Identity

21. $\boldsymbol{csc\theta - sin\theta = cos\theta cot\theta}$

22. $\frac{\sec\theta - \cos\theta}{\sec\theta + \cos\theta} = \frac{\sin^2\theta}{1+\cos^2\theta}$

23. $\frac{\sin^2\theta - \tan\theta}{\cos^2\theta - \cot\theta} = \tan^2\theta$

24. Find each exact value.

a. sin15°

b. tan 165°

25. Find the exact value of $\sin\left[\tan^{-1}\left(\frac{-4}{3}\right) + \cos^{-1}\left(\frac{5}{13}\right)\right]$

26. Given $\tan\theta = \frac{2}{5}$ $\pi < \theta < \frac{3\pi}{2}$ Find the exact value of the following:

a. $\sin(2\theta)$

b. $\cos(2\theta)$

c. $\cos\left(\frac{\theta}{2}\right)$

27. Solve the following trig equations on the interval $[0, 2\pi)$. Leave answers in radian form.

a. $4\cos^2\theta = 1$

b. $\sec\frac{3\theta}{2} = -2$

c. $2\cos^2\theta + \cos\theta = 1$

d. $\cos^2\theta - \sin^2\theta + \sin\theta = 0$

28. Solve each triangle. Round sides to 2 decimal places and find all angles in degrees to 1 decimal place.

a. $A = 50°$, $C = 20°$, $a = 3$

b. $a = 3$, $b = 7$, $A = 70°$

c. $b = 4$, $c = 5$, $B = 40°$

d. $a = 3$, $b = 4$, $C = 40°$

e. $a = 3$, $b = 4$, $c = 6$

29. Find the area of the triangles in part **d** and **e** above.

30. Plot each polar coordinate and find the rectangular coordinate of each point.

a. $\left(4, \frac{3\pi}{2}\right)$

b. $\left(-3, -\frac{3\pi}{4}\right)$

c. $(5, 300°)$

31. Transform each polar equation into an equation in rectangular coordinates. Then graph the equation.

a. $r\sin\theta = 4$

b. $r = -4\cos\theta$

32. Plot each complex number and write it in polar form. Express the argument in degrees.

a. $1 + \sqrt{3}i$

b. $2 - 2i$

c. $-3i$

33. Write the expression $\left[\sqrt{3}\left(\cos 10^\circ + i\sin 10^\circ\right)\right]^6$ in the standard form a + bi.

34. If **v** = 2**i** – 4**j** and **w** = 5**i** +6**j** find the following:

a. 3**v** + 2**w** **b.** ||**v**||–||**w**|| **c.** Unit vector of **v**. **d.** Find the dot product v·w

35. Find the 4th root of 16. Write the answer in a+bi form.

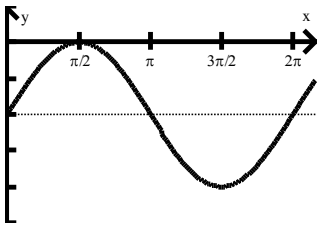
answers:

1. $\frac{\sqrt{3}}{2}$ **2.** $\sqrt{2}$ **3.** $-\sqrt{3}$ **4.** –2 **5.** 1 **6.** 0 **7.** 0 **8.** undef. **12.** $-\frac{\sqrt{3}}{2}$

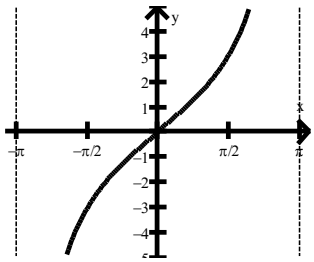
9. 300°, $\frac{5\pi}{3}$ $\cos\theta = \frac{1}{2}$, $\tan\theta = -\sqrt{3}$, $\csc\theta = -\frac{2}{\sqrt{3}}$, $\sec\theta = 2$, $\cot\theta = -\frac{1}{\sqrt{3}}$ **10. a.** -108° **b.** 40 $^\circ$

11. a. $\frac{16\pi}{9}$ **b.** $\frac{-20\pi}{9}$ **12. a.** $\frac{\pi}{6}$ **b.** $\frac{5\pi}{6}$ **c.** $\frac{\pi}{6}$ **d.** $-\frac{\pi}{4}$ **e.** $\frac{\pi}{2}$ **f.** $\frac{-\pi}{2}$

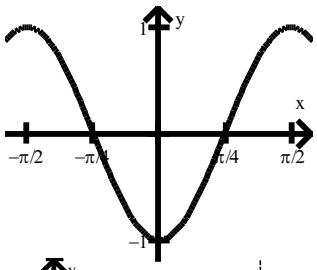
13. a.



b.



c.



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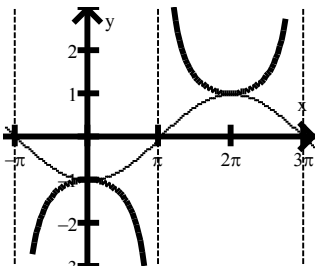

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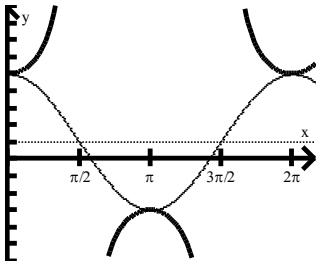

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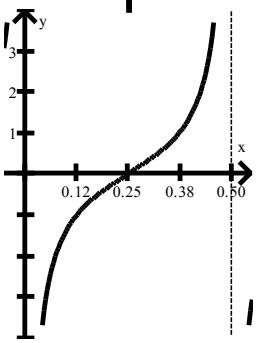


14. $\cos\theta = \frac{-\sqrt{65}}{9}$ $\tan\theta = -\frac{4}{\sqrt{65}}$ $\csc\theta = \frac{9}{4}$ $\sec\theta = -\frac{9}{\sqrt{65}}$ $\cot\theta = -\frac{\sqrt{65}}{4}$

15. $\sin\theta = -\frac{4}{5}$ $\cos\theta = \frac{3}{5}$ $\tan\theta = -\frac{4}{3}$ $\csc\theta = -\frac{5}{4}$ $\sec\theta = \frac{5}{3}$ $\cot\theta = -\frac{3}{4}$

16. a. –.64 b. –1.02 **c.** 3.08 **d.** –4.49 **17. a.** 1.51 **b.** –.97 **c.** 2.25

18. x = 8.18 y = 8.78 **19. a.** 2203.29 ft **b.** 75.52°, yes it will reach 15.49 ft **c.** 68.82 ft

20. $-\frac{5}{12}$ **21 – 23** We'll go over in class **24 a.** sin(60 – 45) = $\frac{\sqrt{3}-1}{2\sqrt{2}}$ **b.** tan(120 + 45) = $\frac{-\sqrt{3}+1}{1+\sqrt{3}}$

25. $\frac{16}{65}$ **26. a.** $\frac{20}{29}$ **b.** $\frac{21}{29}$ **c.** $-\sqrt{\frac{\sqrt{29}-5}{2\sqrt{29}}}$

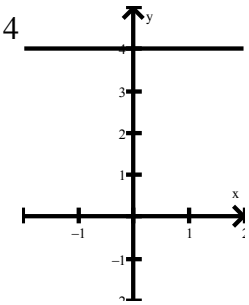
27. a. $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$ **b.** $\frac{4\pi}{9}, \frac{8\pi}{9}, \frac{16\pi}{9}$ **c.** $\frac{\pi}{3}, \frac{5\pi}{3}, \pi$ **d.** $\frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}$

28a. C = 110° **b** = 3.68 **c** = 1.34 **b.** No tri **c.** $a_1 = 6.21, A_1 = 86.5^\circ, C_1 = 53.5^\circ, a_2 = 1.45, A_2 = 13.5, C_2 = 126.5$

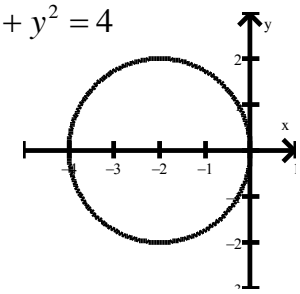
d. c = 2.57, A = 48.6°, B = 91.4° **e.** A = 26.4°, B =36.3°, C = 117.3°

29. d. 3.86 u² **e.** 5.33 u² **30. a.** (0, –4) **b.** $\left(\frac{3}{\sqrt{2}}, \frac{3}{\sqrt{2}}\right)$ **c.** $\left(\frac{5}{2}, -\frac{5\sqrt{3}}{2}\right)$

31. a. y = 4



b. $(x+2)^2 + y^2 = 4$



32a. 2(cos 60° + *i*sin60°)

b. $2\sqrt{2}(\cos 315^\circ + i\sin 315^\circ)$

c. 3(cos 270° + *i*sin270°)

33. $\frac{27}{2} + \frac{27\sqrt{3}}{2}i$ **34. a.** 16**i** **b.** $2\sqrt{5} - \sqrt{61}$ **c.** $\frac{i}{\sqrt{5}} - \frac{2j}{\sqrt{5}}$ **d.** -14

35. $\sqrt[4]{16}\left[\cos\left(\frac{0^\circ}{4} + \frac{360^\circ K}{4}\right) + i\sin\left(\frac{0^\circ}{4} + \frac{360^\circ K}{4}\right)\right]$

$2(\cos 0^\circ + i\sin 0^\circ) = 2(1 + 0i) = 2$

$2(\cos 90^\circ + i\sin 90^\circ) = 2(0 + 1i) = 2i$

$2(\cos 180^\circ + i\sin 180^\circ) = 2(-1 + 0i) = -2$

$2(\cos 270^\circ + i\sin 270^\circ) = 2\big(0 + i(-1)\big) = -2i$