

# Precalculus Online, Test 2 Review

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•The test will cover sections 4.5, 4.6, 5.1-5.5 and 6.1-6.6.

•To study, you can look over your notes, rework HW problems on WebAssign, quizzes, and exercises from the notes, as well as work out the practice problems given at the top of each section of lecture notes. The Review Questions in the textbook at the end of Chapters 4, 5 and 6 are also good practice. The Test 2 from my 2017 summer online course is on blackboard, and you can also look at the following problems from tests on my website:

(a) Summer 2016 Online: Test 2

(b) Fall 2013: Quizzes 5 and 6, Test 3: #1, 3, 4, 5, 7-10, Minitest 4 (All)

(c) Summer 2009: Quiz 2 #1, 2, 3a, 4; Quiz 3 #4; Test 1 #6, 7; Test 2 # 1, 2, 4, 6, 7, 8, 9;  
Test 3 #2, 4, 9ac, 10

•Calculators are allowed on this test, but for certain questions you will NOT be allowed to use a calculator. There will be certain questions for which you will need a calculator, though.

•You must know the unit circle! There will be questions on the test where you will not have a calculator and you will have to find certain trigonometric values. You will also need to know the basic definitions of the trig ratios (SOHCAHTOA,  $\tan = \sin/\cos$ ,  $\sec = 1/\cos$ , etc), you need to know that  $\sin^2 + \cos^2 = 1$ , and you will need to know the Law of Sines (section 6.5). You do NOT need to memorize the Law of Cosines (section 6.6) or the quadratic formula, both of which will be given to you on the test—however, you WILL need to know how to use them.

•Some practice problems to work on:

1. Bob invests \$10,000 in a bank account at 4% interest, compounded continuously. How many years will it take until he has \$21,000 in the account? Round to the nearest 0.1 years.

2. Solve the equations. Round your answer to the nearest 0.01.

(a)  $7^{x/2} = 5^{1-x}$

(b)  $\log_{10} x + \log_{10}(x - 3) = 1$

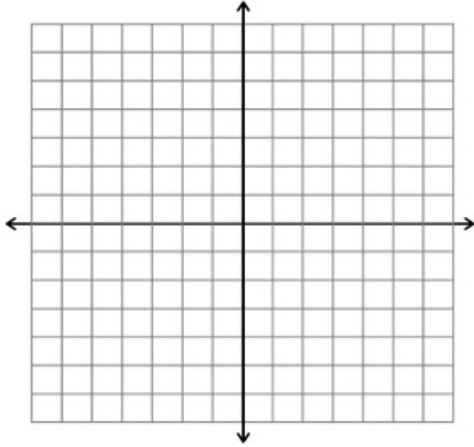
3. The bat population in a certain region was 350,000 in 2009, and the observed doubling time for the population is 25 years. When will the population reach 2 million?

4. The half-life of palladium is 4 days. After 20 days a sample has been reduced to a mass of 0.375 grams. After how many days was exactly one gram left?

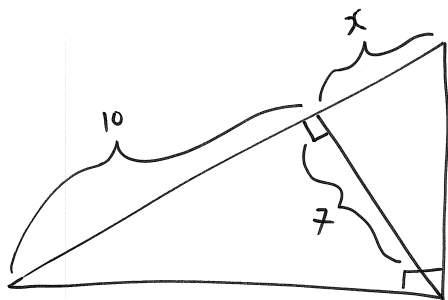
5. (a) Find the reference number for  $t = \frac{-35\pi}{4}$ .

(b) Find the terminal point for  $t = \frac{41\pi}{6}$ .

6. (a) Find  $\cos t$  and  $\csc t$  if  $\tan t = \frac{1}{4}$  and  $t$  lies in Quadrant III.  
 (b) Without a calculator, find the following. If an expression does not exist, write DNE and explain why it does not exist.
- (i)  $\sin \frac{3\pi}{4}$                       (ii)  $\tan \frac{-7\pi}{3}$                        $\sec \frac{7\pi}{2}$
7. Without a calculator, sketch a graph of  $y = 3 \cos \left( \pi \left( x + \frac{\pi}{4} \right) \right)$ .
8. Without a calculator, sketch a graph of  $y = 2 \cot 3 \left( x - \frac{\pi}{6} \right)$ .



9. Without a calculator, find the exact value of the following. If an expression does not exist, write DNE and explain why it does not exist.
- (a)  $\sin^{-1} \left( -\frac{\sqrt{2}}{2} \right)$   
 (b)  $\cos^{-1}(1)$   
 (c)  $\tan^{-1}(1)$   
 (d)  $\cos^{-1} \left( \frac{\pi}{2} \right)$   
 (e)  $\tan^{-1}(-\sqrt{3})$   
 (f)  $\tan^{-1} \left( \tan \left( \frac{4\pi}{3} \right) \right)$   
 (g)  $\tan(\sin^{-1}(1))$
10. Sketch a graph of the tangent function for  $x$ -values between  $-\pi/2$  and  $\pi/2$ . Now draw the line  $y = x$ , and flip the graph of tangent over the line  $y = x$  to sketch the graph of  $y = \tan^{-1} x$
11. New York and Los Angeles are 2450 miles apart. Thinking of that distance as an arc lying on a circle, find the angle that the arc subtends at the center of the earth. (Note: you will need to use the fact that the radius of the earth is 3960 miles). Find the angle in both radians and degrees, round to the nearest 0.1.
12. Solve the right triangle with a hypotenuse of length 20 and one angle equal to  $53^\circ$ . Round to the nearest 0.1.
13. Solve for  $x$ . Round to the nearest 0.1.



14. A plane is flying at an elevation of 5000 feet, directly above a straight highway. Two cars are on the highway on opposite sides of the plane. The angle of depression to one car is  $35^\circ$  and the angle of depression to the other car is  $48^\circ$ . How far apart are the cars? Round to the nearest 0.1 feet.
15. Write  $\sec \theta$  in terms of  $\sin \theta$ , assuming  $\theta$  is in Quadrant 2.
16. Find the exact value of  $\sin(\tan^{-1} \frac{11}{8})$ , without using a calculator. Then write it as a decimal number and compare to what you get on a calculator.
17. Beatrice is playing “make a triangle”, one of her favorite games. She walks 36 feet from point  $M$  to point  $N$ , then turns  $57^\circ$  and walks in a straight line to point  $P$ . She then turns  $94^\circ$  and walks in a straight line back to point  $M$ . At which point she sits down and starts crying, because she realizes that she forgot to measure the distances for lines  $\overline{NP}$  and  $\overline{MP}$ , as well as angle  $M$ . Console Beatrice by calculating all of those values for her without rewalking the triangle.
18. Quadrilateral  $ABCD$  has the following dimensions:  $\overline{AD} = 13$ ,  $\overline{AB} = 11$ ,  $\overline{BC} = 17$ ,  $\overline{CD} = 8$ , and angle  $A$  is  $38^\circ$ . Let  $\overline{BD}$  be the diagonal that cuts  $ABCD$  into two triangles. Calculate the measurement of angle  $CDB$  or explain why such a quadrilateral does not exist. Back up any conclusions you make with mathematical calculations and/or explanations.