

Sample Problems for Exam 2

Precalculus, Mth 130, Spring 2014

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- Exam 2: Wed March 26th, Review: Mon March 24th
 - The exam will have fewer questions than here.
 - Syllabus for Exam 2: Sections 3.7, 5.1 - 5.4, 5.6, 6.1, 6.2, 6.3
 - Review WebAssign problems and classwork problems.
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1. For the functions given below find the following:

- (a) Domain (b) Horizontal and vertical asymptotes (c) Zeros of the function
(d) Sketch the graph.

(i) $\frac{2x+7}{6+3x}$ (ii) $\frac{x+4}{x^2+3x-10}$ (iii) $\frac{x^2-4x-12}{x^2+3x}$ (iv) $\frac{x^3-9x}{(x+1)(x-5)(x+6)}$

2. Find the equations of the slant asymptotes of the following rational functions.

(i) $\frac{3x^2-5x+1}{3x+2}$ (ii) $\frac{2x^3+7}{x^2+4x-1}$

3. Fill in the following table:

θ	$0 = 0^\circ$	$\pi/6 = 30^\circ$	$\pi/4 = 45^\circ$	$\pi/3 = 60^\circ$	$\pi/2 = 90^\circ$	$\pi = 180^\circ$
$\sin \theta$						
$\cos \theta$						
$\tan \theta$						

4. Use reference angle to find the following exact values:

- (a) $\sin(-\pi/3)$ (b) $\cos(120^\circ)$ (c) $\tan(210^\circ)$ (d) $\sec(5\pi/3)$
(e) $\csc(135^\circ)$ (f) $\cot(240^\circ)$ (g) $\cos(3\pi/4)$ (h) $\sin(13\pi/6)$

5. Draw the triangle and find the other five trigonometric function values for each of the following (assuming that θ is acute)

- (a) $\sin \theta = 3/5$ (b) $\tan \theta = 2/\sqrt{5}$

6. Solve the right triangle $\triangle ABC$ with $\angle C = 90^\circ$ for each of the following:

- (a) $\angle A = 20^\circ$ and $c = 3$ (b) $\angle B = 40^\circ$ and $a = 20$.

7. The highest free-standing tower in the world is the CN Tower in Toronto, Canada. From a distance of 1 km from its base, the angle of elevation to the top of the tower is 28.81° . Find the height of the tower.
8. (Radius of the earth) From a satellite 600 mi above the earth, it is observed that the angle formed by the vertical and the line of sight to the horizon is 60.276° . Use this information to find the radius of the earth.
9. For the given functions, (1) Find the amplitude, period, frequency and phase shift of the motion. (2) Write down the interval for one complete period and mark 5 equidistant point on it. (3) Sketch the graph of the displacement over one complete period.
 - (a) $y = 2 \sin 3t$
 - (b) $y = -5 \cos(\frac{t}{2})$
 - (c) $y = 3 \cos(\frac{1}{2}t + \frac{\pi}{2})$
10. A point P moving in simple harmonic motion completes a 8 cycles every second. If the amplitude of the motion is 50 cm, find an equation that describes the motion of P as a function of time, assuming that P is at its maximum displacement when $t = 0$.
11. In a predator/prey model, the predator population is modeled by the function

$$y = 900 \cos 2t + 8000$$

where t is measured in years.

- (a) Find the maximum population.
 - (b) Find the length of time between successive periods of maximum population.
12. An automobile wheel has a diameter of 14 inches. If the car travels at the speed of 55 mph, what is the angular velocity, in radians per hour, of a point on the edge of the wheel.
13.
 - (a) Assuming the earth rotates about its axis once every 24 hours and the radius of earth is about 3960 miles, Find the angular and linear speed of a point on the equator in rad/hr and mi/hr respectively.
 - (b) The wheels of a car have radius 11 inches and are rotating at 600 rpm. Find the (linear) speed of the car in mi/hr . (1 mile = 63360 inches).
 - (c) A truck with 48-in.-diameter wheel is travelling at 50 mi/hr . Find the angular speed of the wheels in rad/hr and in rad/min .