

College of Staten Island  
Mathematics Department  
Math 130 Section 8962  
Final Exam  
Fall 2012

NAME (please print) : \_\_\_\_\_

Signature: \_\_\_\_\_

Do all problems. Show all work, not just the final result, for full credit.

Problem Number	Possible Points	Points Earned
1	4	
2	6	
3	6	
4	4	
5	8	
6	6	
7	5	
8	5	
9	6	
10	5	
11	5	
12	5	
13	5	
14	5	
15	5	
16	5	
17	5	
18	5	
19	5	
Total	100	

College of Staten Island  
Mathematics Department  
Math 130 Section 8962  
Final Exam  
Fall 2012

1.  $g(x) = \frac{\sqrt{2+x}}{3-x}$

Find the domain of  $g(x)$

2a. Find  $f(g(h(x)))$

$f(x) = x - 1$

$g(x) = \sqrt{x}$

$h(x) = x - 1$

b. Express the function in the form:  $h(x) = f(g(x))$

$H(x) = (x^2 - 9)^{37}$

$f(x) =$

$g(x) =$

3. A quadratic function is given:  $f(x) = 3x^2 - 12x + 13$

a) Express the quadratic function in standard form

b) Find its vertex and its y - intercept

c) Sketch its graph

4. Let  $P(x) = 2x^3 - 7x^2 - 7x + 30$ . Show that  $P(-2) = 0$  and use this fact to factor  $P(x)$  completely.

5. Find the intercepts and asymptotes and then sketch a graph of the rational function

$$f(x) = \frac{3x+6}{x^2+2x-8}$$

6. Find the amplitude, period, phase shift, and graph one complete period:

$$y = 2 \cos\left(\frac{x}{2} + \frac{\pi}{4}\right)$$

7. Find the inverse of f:

$$f(x) = \frac{1+3x}{5-2x}$$

8. Use an addition or subtraction formula to write the expression as a trigonometric function of one number, and then find its exact value.

$$\cos\left(\frac{13\pi}{15}\right) \cdot \cos\left(\frac{-\pi}{5}\right) - \sin\left(\frac{13\pi}{15}\right) \cdot \sin\left(\frac{-\pi}{5}\right)$$

9. Evaluate:

a)  $\tan^{-1}\left(\tan\frac{2\pi}{3}\right)$

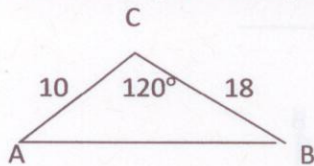
b)  $\cos(\sin^{-1}\frac{\sqrt{3}}{2})$

10. Verify (prove) the identity:  $\frac{\sin\theta - \csc\theta}{\cos\theta - \cot\theta} = \frac{\cos\theta}{1 - \sin\theta}$



11. Solve  $\triangle ABC$ .

Find: side  $c$  (3 decimal places),  $\angle A$  (1 decimal place),  $\angle B$  (1 decimal place)



12. Find a function that models the simple harmonic motion having the given properties:

a. Amplitude = 1.2 m , freq = 0.5 Hz (Assume the displacement is zero at time  $t = 0$ )

b. Amplitude = 35 cm, period = 8s (Assume that the displacement is at its maximum at time  $t = 0$ )

13. Consider the equation:  $2\sin^2 x - \cos x = 1$ . Find the solutions in the interval  $[0, 2\pi)$

14. Solve each of the following equations using a graphing calculator. Approximate solutions in  $[0, 2\pi)$  to two decimal places.

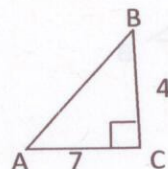
a)  $x^2 - 1.5 = \cos x$

b)  $\sin x - \cos x = \cot x$

15. For the angle A shown in the right triangle get exactly each of the following:

a)  $\sin A =$  \_\_\_\_\_  $\cos A =$  \_\_\_\_\_

b)  $\sin 2A$



c)  $\cos 2A$

d)  $\tan 2A$

16. Write  $f(x) = 5 \sin x + 8 \cos x$  in the form  $f(x) = k \sin(x + \varphi)$

17. You are given that  $\cos A = \frac{-2}{3}$  and A is in quadrant II  
 $\sin B = \frac{1}{2}$  and B is in quadrant I

Find exactly each of the following, leaving your answers as fractions and not computing irrational square roots.

a)  $\sin A =$

b)  $\cos B =$

c)  $\cos(A+B) =$

d)  $\sin \frac{A}{2}$

e)  $\tan \frac{A}{2}$

18. Find the exact value of the product:  $\cos 37.5^\circ \cdot \cos 7.5^\circ$  (Hint: Use Product-to-Sum Formula)

19. A polynomial  $P$  is given;  $P(x) = 4x^4 + 2x^3 - 2x^2 - 3x - 1$   
Find all zeros of  $P$ , real and complex.

