

**Final Exam**

Prob.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Value	8	15	6	15	10	10	15	16	5	20	10	5	15	15	15	20	200
Points																	

Show all work for credit. Answers with little or no supporting work will receive little or no credit.

1. Short answer.  $a = 4.6$ ,  $b = 3.5$ ,  $c = -2.23$ , and  $d = 3$ . Evaluate.

(a)  $-c^2$

(b)  $\frac{-b + \sqrt{c^2 + ab}}{.01d(c - a)}$

2. Solve algebraically:

(a)  $x^6 = 729$

(b)  $(1.075)^{3t} = 12(1.01)^{4t}$

(c) Complete the square:  $x^2 - 84x + 7$

3. Box A is 35% smaller than box B. How much larger is box B than box A?

4. Of the four ways to solve equations, select the best method for each of the following equations. Select Guess and Check if and only if no other method will work. Do not solve.

(a)  $(x - 5)^2(x + 1) + (x - 5)^3(x + 2) = 0$

(b)  $(x + 5)^2(x - 1) - (x - 5)^3(x + 2) = 0$

(c)  $\sin x + 5x = 42$

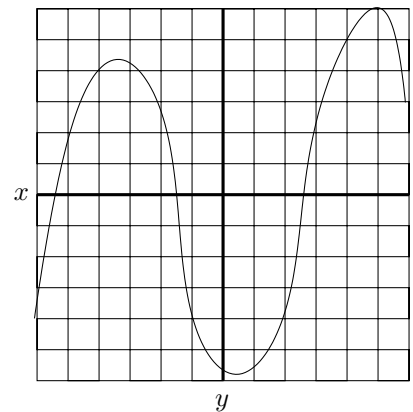
(d)  $\arctan x = 0$

(e)  $\sqrt{x} + x^{1/2} = 2$

5. Here is a graph of  $f(x)$ . Grid lines are one unit apart.

(a) Solve for  $x$ ;  $f(x) = -4$

(b) Solve for  $x$ ;  $f(x) = 2x$



6. Give a rational function,  $f(x)$ , such that it has zeros at 2 and 4; holes at 1 and 3; a vertical asymptote at  $-5$ ; and an end behavior model of  $\frac{3}{5x}$ .

7. Add an amount of 5% salt solution to 130 ml of 8% salt solution. How much does it take to make a 6% salt solution?

8. Let  $f(x) = 5x^2 + 3x - 7$ . Find and simplify  $\frac{f(x+h) - f(x)}{h}$ .

9. What is the maximum number of roots that  $ax^5 + bx^4 + cx^3 + dx^2 + ex + f$  can have?

10. Short Answer:

(a) Give the reference angle of  $\frac{81\pi}{50}$ .

(b) If the arc-length is  $25\pi$  and the radius is 7, what is the central angle?

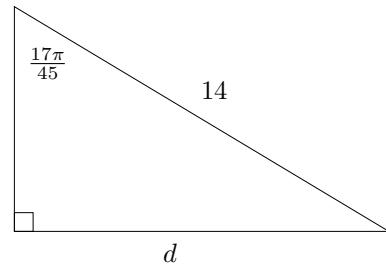
(c) Solve  $\cot \theta = 1.732$  for  $\theta$  in radians.

(d) Convert  $\frac{81\pi}{95}$  to degrees (give an exact answer).

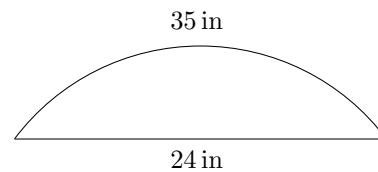
(e) If the central angle is  $\frac{5\pi}{9}$  and the radius is 7, what is the area of the sector?

11. Use a Unit Circle picture to find an identity for  $\sin\left(\frac{\pi}{2} + \theta\right)$ .

12. In the picture, find side  $d$ .

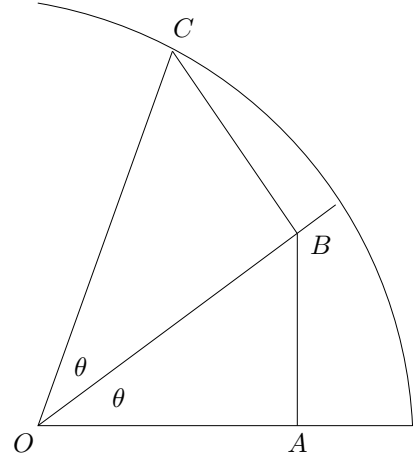


13. You are trying to restore an old staircase in a house. The staircase had disk-shaped steps set into the wall. You measure the distance across the opening as 24in. and the distance around the back edge of the hole as 35in. What does the radius of the steps need to be to fill the hole?



14. Determine  $\cos\left(\sin^{-1}\frac{x}{4}\right)$ . (Assume the angle is in the first quadrant and give an answer in terms of  $x$  alone).

15. In the unit circle picture to the right, two angles are  $\theta$ , as labelled, and  $OB = .85$ . Find  $OA$ .



16. Given  $\sin(2\theta) = 2(\sin \theta)(\cos \theta)$  and  $\cos(2\theta) = \cos^2 \theta - \sin^2 \theta$ , derive the Squared Function Identity for  $\cos^2 \theta$ .