1. B
2. C
3. A **(Thrown Out at Convention)**
4. D
5. B
6. C
7. E
8. D
9. A **(Thrown Out at Convention)**
10. C
11. D
12. B
13. E
14. D
15. A
16. D
17. C **(Thrown Out at Convention)**
18. A
19. B
20. C
21. B
22. D
23. A **(Thrown Out at Convention)**
24. E
25. B
26. D
27. D **(Thrown Out at Convention)**
28. E
29. D
30. B
31. Isolate for  and solve



1.  

Since we are on the interval , the only acceptable solution is 

1. The longest diagonal in a cube is equivalent to  in a cube of side length.





But problem asks for the answer in terms of cubic yards



1. First parametrically define  and 

 



1. Draw a diagram and label the sides arbitrarily  and 

 

Find  and set it equal to zero to find the maximum



The maximum area is

1. Use integration by parts with , ,  , and 







Repeat this process 5 more times or recognize that the pattern from repeating the process yields





1. Recall 

 



Make the substitution 



1. Given two hallway widthsand, the maximum length of such a ladder is

More general solutions are

 and

For those who want a more mathematical solution to the problem







Ө y 64

 Ө x

27

Set  equal to zero and solve for

the maximum

 

1. The algorithm can be rewritten to a more noticeable notation, Newton-Rahpson Method.



We can summarily reinterpret  as the absolute value of the difference between the third and second iteration



 

1. The function is decreasing when  is decreasing.

The easiest way is to rewrite the absolute value expression as a piecewise function





Using the first derivative test,  is decreasing when 

Using the first derivative test,  is decreasing when 

Hence the function decreases on the intervals 

1. The amount of water in the pool at any given time is 



occurs when 

1. 



The unit normal vector has slope 



1. First find the time  the distance between the foci is 

 The only Pythagorean triple with 18 is 18-24-30 so 



1. 





For Numbers 15 and 16: Recall that any probability density function has an area of 1 bounded beneath it, check to see that the function is defined on the stated interval

 

1. 
2.  
3. Pay attention, some terms in the matrix being solved for are repeated both  and  appear twice. The max is .





 

1. 
2. Use the tangent line approximation with 



1. The profit or revenue can be represented by the equation

 The maximum occurs at 

1. First find the point of intersection



The angle can be determined by analyzing the slopes of the tangents at the point of intersection







 

1. Essentially the question asks for the minimum of the first derivative

 The absolute minimum of  occurs at  

1. The general form of Newton’s Law is  but for those looking for a more mathematical solution

  

1.  We can conclude 



1. 
2. First find where the two functions intersect





1. 





1. The basin is full when the water in cup has a volume of 









1. We know  to be the definite area under the curve and  represents the area under the curve by trapezoidal rule

First check to make sure 



 which is true on the interval







1. Use the substitution , which means  and 

