***Section* 2.2 – Trigonometric Integrals**

**Products of Powers of *Sines* and *Cosines***

We begin with integrals of the form



***Example***

Evaluate 

***Solution***



 

 





***Example***

Evaluate 

***Solution***

  







***Example***

Evaluate 

***Solution***

 



























***Example***

Evaluate 

***Solution***





 

 









***Example***

Evaluate 

***Solution***











**Products of Powers of *tan x* and *sec x***

***Example***

Evaluate 

***Solution***

 









 



***Example***

Evaluate 

***Solution***

Let: 



















**Products of Sines and Cosines**

Recall the identities







***Example***

Evaluate 

***Solution***









**Guidelines for Cosine & Sine**

***Case* 1** If ***m*** is ***odd***, we write *m* as  and use the identity  to obtain



Then we combine the single  with  in the integral and set 

***Case* 2** If ***m*** is ***even* and *n*** is ***odd***, in  we write *n* as  and use the identity  to obtain



Then we combine the single  with  in the integral and set 

***Case* 3** If both ***m*** **and *n*** are ***even***, in , we substitute

To reduce the integrand to one in lower powers of  

**Guidelines for Tangent & Secant**

***Case* 1** When the power of the tangent is ***odd*** and positive.





***Case* 2** When the power of the secant is ***even*** and positive.



***Case* 3** When there are no secant factors



***Case* 4** When there are only secant, use integration by parts.

***Case* 5** Otherwise, convert to cosines and sines.

***Wallis’s Formulas***

|  |
| --- |
| 1. If *n* is odd , then 2. If *n* is even , then |

***Formulas***















***Exercises*** ***Section* 2.2 – Trigonometric Integrals**

(**1 − 149**) Evaluate the integrals

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | |  | | | |  | |
|  | |  | |  | | | |
|  | | |  | | |  | | |

|  |  |  |
| --- | --- | --- |
|  |  |  |

1. Find the area of the region bounded by the graphs of  and  on the interval 

Find the area of the region bounded by the graphs of the equations

1. 
2. 
3. 
4. 

Find the volume of the solid generated by revolving the region bounded by the graphs of the equations about the 

|  |  |
| --- | --- |
|  |  |

Find the ***volume*** of the solid generated by revolving the region bounded by the graphs of the equations about the , then find the ***centroid*** of the region

|  |  |
| --- | --- |
|  |  |