**Chapter 3**

**Techniques of Integration**

**3.3 Trigonometric Substitution**

**Section Exercises**

**Simplify the following expressions by writing each one using a single trigonometric function.**

127. 

Answer: 

129. 

Answer: 

**Use the technique of completing the square to express each trinomial as the square of a binomial.**

131. 

Answer: 

133. 

Answer: 

**Integrate using the method of trigonometric substitution. Express the final answer in terms of the variable.**

135. 

Answer: 

137. 

Answer: 

139. 

Answer: 

141. 

Answer: 

143. 

Answer: 

145. 

Answer: 

147. 

Answer: 

149. 

Answer: 

151. 

Answer: 

153. 

Answer: 

**In the following exercises, use the substitutions  or  Express the final answers in terms of the variable *x.***

155. 

Answer: 

157. 

Answer: 

159. 

Answer: 

**Use the technique of completing the square to evaluate the following integrals.**

161. 

Answer: 

163. 

Answer: 

165. Evaluate the integral without using calculus: 

Answer:  area of a semicircle with radius 3

167. Evaluate the integral  using two different substitutions. First, let  and evaluate using trigonometric substitution. Second, let  and use trigonometric substitution. Are the answers the same?

Answer:  is the common answer.

169. Evaluate the integral  using the form  Next, evaluate the same integral using  Are the results the same?

Answer: is the result using either method.

171. State the method of integration you would use to evaluate the integral

 Why did you choose this method?

Answer: Use trigonometric substitution. Let 

173. Find the length of the arc of the curve over the specified interval:  Round the answer to three decimal places.

Answer: 4.367

175. The region bounded by the graph of  and the *x*-axis between  and  is revolved about the *x-*axis. Find the volume of the solid that is generated.

Answer: 

**Solve the initial-value problem for *y* as a function of *x*.**

177. 

Answer: 

179. An oil storage tank can be described as the volume generated by revolving the area bounded by  about the *x*-axis. Find the volume of the tank (in cubic meters).

Answer: 24.6 m3

181. Find the length of the curve  between  and 

Answer: 

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