 Case 1:

Solve the differential equation , given that when .

Method 1: Indefinite Integral technique

| Worked solution | Explanation |
| --- | --- |
|  | Multiply both sides of the equation by so that the variables are separated. |
|  | Integrate both sides of the equation. |
|  | Acknowledge the constant on the right-hand side of the equation only. |
| ❶ | Simplify the expression. |
|  | Substitute in when . |
|  | Rearrange to find . |
|  | Substitute back into ❶ |

Method 2: Definite integral technique

| Worked solution | Explanation |
| --- | --- |
|  | Multiply both sides of the equation by so that the variables are separated. |
|  | Integrate both sides of the equation by forming an integral with variables *x* and *y* as the upper limits and the conditions and as the lower limits. |
|  | There is no need to consider constant values using this method. |
|  | Evaluate both integral statements using the limits. |
|  | Rearrange to find the solution. |