**4. PARTIAL DERIVATIVE**

If is a function of x and y then,

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

**Homogeneous Function:**

If degree of each term in the function is same, function is said to be Homogeneous Function.

If , f is Homogeneous function with degree **“n”.**

**1) Euler’s Theorem:**

If is Homogeneous function with degree “n” in x and y,

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

**2) Euler’s Theorem:**

If is not Homogeneous function but function of u (let’s say F(x)) is Homogeneous function with degree “n” in x and y,

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

**3) Euler’s Theorem:**

If where f, g and h are homogenous functions of degree m, n ,p respectively,

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

**Total Derivative:**

If where x and y are functions of t, the total derivative of u with respect to t is given by,

|  |  |
| --- | --- |
|  |  |
| Total Differential: | |

Here, “x”, “y”, “z” are intermediate variables. “t” is independent variable. “u” is dependent variable.

**Chain rule for Partial differentiation:**

If where ,

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

Here, “x”, “y” are intermediate variables. “r” and “s” are independent variable. “u” is dependent variable.

If where ,

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

Here, “x”, “y”, “z” are intermediate variables. “r”, “s”, “t” are independent variable. “u” is dependent variable.