$A = p_1x + p_2x^2 + \cdots \ldots + p_nx^n$
Then first solve for x and substitute$(1+r)^{-1} = x$, to find the value of r

Chapter 11 Multi Variables and their Functions

Understanding Surfaces and Distance

For a 3 dimensional figure, the general equation for a plane in space is given by:
$px + qy + rz = s$
Now let us see its economical use,
We can consider each plane or axis to represent a product, then the space is called budget plane, where p, q and r are cost of goods/unit and s is the total value.
Now for a 3D space, we can find the distance between any 2 points on the space,
The formula is given for two point (p_1, q_1, r_1) and (p_2, q_2, r_2)
The distance is given by $distance = \sqrt{(p_1, -p_2)^2 + (q_1 - q_2)^2 + (r_1 - r_2)^2}$
Now the equation for a sphere is given for a center (u, v, w) and radius r
$(x-u)^2 + (y-v)^2 + (z-w)^2 = r^2$

Chapter 12 Comparative Statistics

A peek into General Cases:

For partial derivatives when we know $z = f(x, y)$ and c is a constant
$F(x,y,z) = c \Rightarrow z'_x = -\frac{F'_x}{F'_z},\ \ z'_y = -\frac{F'_y}{F'_z}\ for\ F'_z \neq 0$
Now for a more general case,
$F(x_1, x_2, \ldots \ldots, x_n, z) = \frac{\delta F/\delta x_i}{\delta F/\delta z}$, $where\ i = 1,2, \ldots \ldots, n$

Understanding Linear Approximation

The Linear approximation to f(x) about (x_o, y_o) is given by the formula
$f(x,y) \approx f(x_o, y_o) + f'_1(x_o, y_o)(x - x_o) + f'_2(x_o, y_o)(y - y_o)$
Where, $f'_1(x_o, y_o)$, stands for first derivative of (x_o, y_o) in terms of x and $f'_2(x_o, y_o)$ stands for the first derivative of (x_o, y_o), in terms of y.
Now one can generalize the above equation to re-write it for functions of several variables
Linear approximation to $z = f(\mathbf{x}) = f(x_1, \ldots \ldots x_n)$ $about$ $\mathbf{x}^0 = (x_1^0, \ldots \ldots, x_n^0)$
$f(\mathbf{x}) \approx f(\mathbf{x}^0) + f'_1(\mathbf{x}^0)(x - x^0) + \ldots \ldots \ldots . + f'_n(\mathbf{x}^0)(x_n - x_n^0)$
Again $f'_n(x^0)$ stands for the first derivative in terms of the nth variable in the equation

Tangent Planes:
Tangent plane to the graph of
$z = f(x, y)$ *at the point* $(a, b.c)$, *with* $c = f(a, b)$ *has the equation*
$z - c = f'_1(a, b)(x - a) + f'_2(a, b)(y - b)$

Understanding Differentials

For $a = f(b, c)$ at a point (b, c) the differential will be
$a = f(b, c)$
$da = f'_1(b, c)db + f'_2(b, c)dc$
Where db and dc mean differentiation of b and c respectively

Understanding the systems of Equations

1. Finding the Number of Degree of Freedom: (The counting Rule)
   - First count the number of variables or n , and then how many number of 'independent' equations are there or i,
   - Now if $n>i$ then $n-i$ is the number of degree of freedom
   - If $n<i$, then there is no solution to that system
2. For a system of equation if we say that it has n number of variables then it will have P number of degree of freedom
   - P is the number of variables that can be chosen freely
   - And n-p is the number of variables whose value can be found when the value of p is decided upon (these are depended on the value of the p)

Basics of Differentiating Systems of Equation

The First step is to differentiate both side of the equation with respect to their variables,
Example: $2a + 2b = 3x - 2y$ then it would be $2da + 2db = 3dx - 2dy$
Next step would be to find the values of da *and* db in terms of dx *and* dy by using the two equations,
Next step is to find a'_x *and* b'_x *also* a'_y *and* b'_y,

just remember that if the equation for da looks like $da = 3dx + 4dy$ then the result would be simply $a'_x = 3$ *and* $a'_y = 4$

Then you can just substitute the points given to find the exact values