

MA 22400 – EXAM 3 FORMULAS

LAGRANGE EQUATIONS

For the function $f(x, y)$ subject to the constraint $g(x, y) = k$, the Lagrange equations are

$$f_x = \lambda g_x \quad f_y = \lambda g_y \quad g(x, y) = k$$

GEOMETRIC SERIES

If $0 < |r| < 1$, then

$$\sum_{n=0}^{\infty} ar^n = \frac{a}{1-r}$$

TAYLOR SERIES

The Taylor series of $f(x)$ about $x = a$ is the power series

$$\sum_{n=0}^{\infty} a_n(x-a)^n \quad \text{where} \quad a_n = \frac{f^{(n)}(a)}{n!}$$

Examples:

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!}, \text{ for } -\infty < x < \infty; \quad \ln x = \sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n} (x-1)^n, \text{ for } 0 < x \leq 2$$

VOLUME & SURFACE AREA

Right Circular Cylinder

$$V = \pi r^2 h$$
$$SA = \begin{cases} 2\pi r^2 + 2\pi r h \\ \pi r^2 + 2\pi r h \end{cases}$$

Sphere

$$V = \frac{4}{3}\pi r^3$$
$$SA = 4\pi r^2$$

Right Circular Cone

$$V = \frac{1}{3}\pi r^2 h$$
$$SA = \pi r \sqrt{r^2 + h^2} + \pi r^2$$