

Math-71 Sections 9, 11, 12

Exam #3 Cheat Sheet

Derivatives

1. $\frac{d}{dx}[c] = 0$
2. $\frac{d}{dx}[x^c] = cx^{c-1}$
3. $\frac{d}{dx}[cf(x)] = cf'(x)$
4. $\frac{d}{dx}[f(x) \pm g(x)] = f'(x) \pm g'(x)$
5. $\frac{d}{dx}[f(x)g(x)] = f(x)g'(x) + f'(x)g(x)$
6. $\frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{g(x)f'(x) - g'(x)f(x)}{[g(x)]^2}$
7. $\frac{d}{dx}[f(u(x))] = f'(u)u'(x)$
8. $\frac{d}{dx}[e^x] = e^x$
9. $\frac{d}{dx}[\ln(x)] = \frac{1}{x}$

Integrals

1. $\int k dx = kx + C$
2. $\int x^k dx = \frac{1}{k+1} x^{k+1} + C$
3. $\int kf(x) dx = k \int f(x) dx$
4. $\int [f(x) \pm g(x)] dx = \int f(x) dx \pm \int g(x) dx$
5. $\int_a^a f(x) dx = 0$
6. $\int_a^b f(x) dx + \int_b^c f(x) dx = \int_a^c f(x) dx = 0$
7. $\int_a^b f(x) dx + - \int_b^a f(x) dx$
8. $\int e^x dx = e^x + C$
9. $\int \frac{dx}{x} = \ln(x) + C$

Second Partial Derivative Test

$$f_x = 0 \text{ and } f_y = 0$$

$$d = f_{xx}f_{yy} - [f_{xy}]^2$$

d	f_{xx}	result
> 0	> 0	relative minimum
> 0	< 0	relative maximum
< 0		saddle point
$= 0$		inconclusive

Lagrange Multiplier

$$F(x, y, \lambda) = f(x, y) - \lambda g(x, y)$$

$$f_x = \lambda g_x$$

$$f_y = \lambda g_y$$

$$g(x, y) = 0$$