

Multivariable Calculus - Math 253, Section 102

Fall 2006

Section 15.1

- 2.(a) 124 ; (b) $h = 60$; (c) $T = 85$.
6. (a) $f(1, 1) = 0$; (b) $f(e, 1) = 1$; (d) $\text{Range}(f) = \mathbb{R}$.
12. Domain = $\{(x, y) : x \geq 0, y \geq 0\}$.
18. Domain = $\{(x, y) : 1 \leq x^2 + y^2 < 4\}$.
30. (a) \rightarrow VI; (b) \rightarrow V; (c) \rightarrow I; (d) \rightarrow iV; (e) \rightarrow II ; (f) \rightarrow III.
54. C, II.
56. A, VI.
58. E, I.
60. Family of ellipsoids when $k > 0$ and the origin when $k = 0$.

Section 15.2

6. 18
8. limit does not exist.
10. limit does not exist.
24. $\{(x, y) : y \leq x^2\}$.
30. $\{(x, y) : x \geq -y^2\}$.

Section 15.3

8. $f_x(2, 1) \approx 2.8$, $f_y(2, 1) \approx -2.1$.
14. $f_x = 5x^4 + 9x^2y^2 + 3y^4$, $f_y = 6x^3y + 12xy^3$.
26. $f_x = 2xe^{yz}$, $f_y = x^2ze^{yz}$, $f_z = x^2ye^{yz}$.
32. $f_x = \frac{y^2}{t+2z}$, $f_y = \frac{2xy}{t+2z}$, $f_t = \frac{-xy^2}{(t+2z)^2}$, $f_z = \frac{-2xy^2}{(t+2z)^2}$.
34. $u_{x_i} = i \cos(x_1 + 2x_2 + \cdots + nx_n)$, $1 \leq i \leq n$.
36. 3.
44. $\partial z / \partial x = \frac{1-yz \cos(xyz)}{xy \cos(xyz)-3}$, $\partial z / \partial y = \frac{2-xz \cos(xyz)}{xy \cos(xyz)-3}$.
46. (a) $\partial z / \partial x = f'(x)g(y)$, $\partial z / \partial y = f(x)g'(y)$;
(b) $\partial z / \partial x = yf'(xy)$, $\partial z / \partial y = xf'(xy)$.
(c) $\partial z / \partial x = \frac{f'(x/y)}{y}$, $\partial z / \partial y = \frac{-xf'(x/y)}{y^2}$.
60. $f_{rss} = -2/s^2$, $f_{rst} = 0$.