March 4, 2007
Section 8.3, Page 549

Problem #29

$$f(x,y)=\sqrt{x^2+y^2}=\left(x^2+y^2\right)^{1/2}$$

$$f_x=\frac{1}{2}\left(x^2+y^2\right)^{-1/2}(2x)=x\left(x^2+y^2\right)^{-1/2}$$

$$f_{xx}=x\left[-\frac{1}{2}\left(x^2+y^2\right)^{-3/2}(2x)\right]+\left(x^2+y^2\right)^{-1/2}(1)$$

$$=-x^2\left(x^2+y^2\right)^{-3/2}+\left(x^2+y^2\right)^{-1/2}$$

$$f_{xy}=x\left(-\frac{1}{2}\right)\left(x^2+y^2\right)^{-3/2}(2y)=-xy\left(x^2+y^2\right)^{-3/2}$$

$$f_y=\frac{1}{2}\left(x^2+y^2\right)^{-1/2}(2y)=y\left(x^2+y^2\right)^{-1/2}$$

$$f_{yx}=y\left(-\frac{1}{2}\right)\left(x^2+y^2\right)^{-3/2}(2x)=-xy\left(x^2+y^2\right)^{-3/2}$$

$$f_{yy}=y\left[\left(-\frac{1}{2}\right)\left(x^2+y^2\right)^{-3/2}(2y)\right]+\left(x^2+y^2\right)^{-1/2}(1)$$

$$=-y^2\left(x^2+y^2\right)^{-3/2}+\left(x^2+y^2\right)^{-1/2}$$

page 517, problem #33

$$f(t)=100e^{-0.1t},\quad r=8\%$$

$$P_V=\int_0^\infty f(t)e^{-rt}\ dt$$

$$=\int_0^\infty 100e^{-0.1t}e^{-0.08t}\ dt=\int_0^\infty 100e^{-0.18t}\ dt=\lim_{b\to\infty}\int_0^b 100e^{-.18t}\ dt$$

$$=\lim_{b\to\infty}\left[100\frac{1}{-0.18}e^{-0.18t}\right]_0^b=\lim_{b\to\infty}\left[-\frac{5000}{9}e^{-0.18b}+\frac{5000}{9}e^0\right]$$

$$=\lim_{b\to\infty}\left[-\frac{5000}{9}\frac{1}{e^{0.18b}}+\frac{5000}{9}e^0\right]=\frac{5000}{9}=555.56$$

$$\frac{100}{0.18}=\frac{100}{18/100}=\frac{10000}{18}=\frac{5000}{9}$$

Page 535, #33

f(x, y) = $x^2 + y^2$

Level curve when $z_0 = 1$

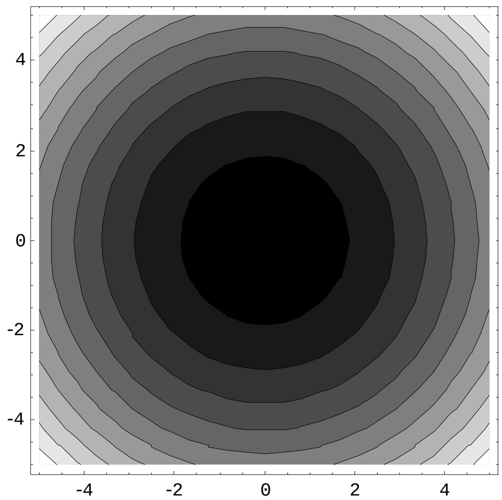
$x^2 + y^2 = 1$: circle, centered at the origin, r =1

When $z_0 = 4$

$x^2 + y^2 = 4$: circle, centered at origin, r =2

When $z_0 = 9$

$x^2 + y^2 = 9$: circle, centered at origin, r = 3


4
2
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