P211 4.5

1(a) $r_1(x,y)=\sqrt{(x-x_1)^2+(y-y_1)^2}-R_1=\sqrt{x^2+y^2-2y+1}-1$

$r_2(x,y)=\sqrt{(x-x_2)^2+(y-y_2)^2}-R_2=\sqrt{x^2+y^2-2x-2y+2}-1$

$r_3(x,y)=\sqrt{(x-x_3)^2+(y-y_3)^2}-R_3=\sqrt{x^2+y^2+2y+1}-1$

$$Dr(x,y)=\begin{bmatrix} x/\sqrt{x^2+y^2-2y+1} & (y-1)/\sqrt{x^2+y^2-2y+1} \\ (x-1)/\sqrt{x^2+y^2-2x-2y+2} & (y-1)/\sqrt{x^2+y^2-2x-2y+2} \\ x/\sqrt{x^2+y^2-2y+1} & (y+1)/\sqrt{x^2+y^2+2y+1} \end{bmatrix}$$

1(b) $r_1(x,y)=\sqrt{(x-x_1)^2+(y-y_1)^2}-R_1=\sqrt{x^2+y^2+2x+1}-1$

$r_2(x,y)=\sqrt{(x-x_2)^2+(y-y_2)^2}-R_2=\sqrt{x^2+y^2-2x-2y+2}-1$

$r_3(x,y)=\sqrt{(x-x_3)^2+(y-y_3)^2}-R_3=\sqrt{x^2+y^2-2x+2y+2}-1$

$$Dr(x,y)=\begin{bmatrix} (x+1)/\sqrt{x^2+y^2+2x+1} & y/\sqrt{x^2+y^2+2x+1} \\ (x-1)/\sqrt{x^2+y^2-2x-2y+2} & (y-1)/\sqrt{x^2+y^2-2x-2y+2} \\ (x-1)/\sqrt{x^2+y^2-2x+2y+2} & (y+1)/\sqrt{x^2+y^2-2x+2y+2} \end{bmatrix}$$

5(a) $y=c_1t^{c_2}$ $\partial y/\partial c_1=t^{c_2}$ $\partial y/\partial c_2=c_1t^{c_2}\ln t$

$$r=\begin{bmatrix} c_1t_1^{c_2}-y_1 \\ c_1t_2^{c_2}-y_2 \\ c_1t_3^{c_2}-y_3 \end{bmatrix} \quad Dr=\begin{bmatrix} t_1^{c_2} & c_1t_1^{c_2}\ln t_1 \\ t_2^{c_2} & c_1t_2^{c_2}\ln t_2 \\ t_3^{c_2} & c_1t_3^{c_2}\ln t_3 \end{bmatrix}$$

5(b) $y=c_1te^{c_2t}$ $\partial y/\partial c_1=te^{c_2t}$ $\partial y/\partial c_2=c_1t^2e^{c_2t}$

$$r=\begin{bmatrix} c_1t_1e^{c_2t_1}-y_1 \\ c_1t_2e^{c_2t_2}-y_2 \\ c_1t_3e^{c_2t_3}-y_3 \end{bmatrix} \quad Dr=\begin{bmatrix} t_1e^{c_2t_1} & c_1t_1^2e^{c_2t_1} \\ t_2e^{c_2t_2} & c_1t_2^2e^{c_2t_2} \\ t_3e^{c_2t_3} & c_1t_3^2e^{c_2t_3} \end{bmatrix}$$