1 Definicie funkcii

(%i1) rho(x,y,z):=sqrt(x^2+y^2+z^2);

(%o1) $\rho(x,y,z):=\sqrt{x^2+y^2+z^2}$

(%i2) theta(x,y,z):=atan(y/x);

(%o2) $\theta(x,y,z):=\operatorname{atan}\left(\frac{y}{x}\right)$

(%i3) psi(x,y,z):=acos(z/sqrt(x^2+y^2+z^2));

(%o3) $\Psi(x,y,z):=\operatorname{acos}\left(\frac{z}{\sqrt{x^2+y^2+z^2}}\right)$

2 Prve derivacie funkcie rho

(%i4) diff(rho(x,z,y),x);

(%o4) $\frac{x}{\sqrt{z^2+y^2+x^2}}$

(%i5) diff(rho(x,z,y),y);

(%o5) $\frac{y}{\sqrt{z^2+y^2+x^2}}$

(%i6) diff(rho(x,z,y),z);

(%o6) $\frac{z}{\sqrt{z^2+y^2+x^2}}$

3 Prve derivacie funkcie theta

(%i7) ratsimp(diff(theta(x,y,z),x));

(%o7) $-\frac{y}{y^2+x^2}$

(%i8) ratsimp(diff(theta(x,y,z),y));

(%o8) $\frac{x}{y^2+x^2}$

(%i9) ratsimp(diff(theta(x,y,z),z));

(%o9) 0

4 Prve derivacie funkcie psi

(%i10) `ratsimp(diff(psi(x,y,z),x));`

(%o10) $$\frac{x\,z}{\sqrt{y^2+x^2}\,(z^2+y^2+x^2)}$$

(%i11) `ratsimp(diff(psi(x,y,z),y));`

(%o11) $$\frac{y\,z}{\sqrt{y^2+x^2}\,(z^2+y^2+x^2)}$$

(%i12) `ratsimp(diff(psi(x,y,z),z));`

(%o12) $$-\frac{\sqrt{y^2+x^2}}{z^2+y^2+x^2}$$

5 Sucet druhych derivacii

(%i16)
```
ratsimp(diff(rho(x,y,z),x,2)+diff(rho(x,y,z),y,2)
+diff(rho(x,y,z),z,2));
```

(%o16) $$\frac{2}{\sqrt{z^2+y^2+x^2}}$$

(%i17)
```
ratsimp(diff(theta(x,y,z),x,2)+diff(theta(x,y,z),y,2)
+diff(theta(x,y,z),z,2));
```

(%o17) 0

(%i18)
```
ratsimp(diff(psi(x,y,z),x,2)+diff(psi(x,y,z),y,2)
+diff(psi(x,y,z),z,2));
```

(%o18) $$\frac{z}{\sqrt{y^2+x^2}\,(z^2+y^2+x^2)}$$