Problem 4

Table of Contents

sphere

```
syms phi th 'real'
r = [sin(phi)*cos(th); sin(phi)*sin(th);cos(phi)];
dr = [diff(r,phi),diff(r,th)];
g1 = simplify(dr'*dr);                                  % metric of
 first form
N = [-cos(th)*sin(phi);-sin(th)*sin(phi);-cos(phi)];
dN = simplify([diff(N,phi),diff(N,th)]);
g2 = simplify(dr'*dN);                                  % metric of
 second form
K = simplify(inv(g1)*g2);                               % curvature
K = subs(K,phi,0);
K = subs(K,th,0);
```

cylinder

```
syms u v 'real'
r = [cos(u);sin(u);v];
dr = [diff(r,u),diff(r,v)];
g1 = simplify(dr'*dr);
N = [cos(u);sin(u); 0];
dN = simplify([diff(N,u),diff(N,v)]);
g2 = simplify(dr'*dN);
```

hyperboloid

```
syms u v 'real'
r = [u;v;v^2-u^2];
dr = [diff(r,u),diff(r,v)];
g1 = simplify(dr'*dr);
N = [2*u;-2*v;1]/(4*u^2+4*v^2 +1)^(1/2);
dN = simplify([diff(N,u),diff(N,v)]);
g2 = simplify(dr'*dN);
K = simplify(inv(g1)*g2);                               % curvature
K = subs(K,u,0);
K = subs(K,v,0);
```

Published with MATLAB® R2020b