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Problem 3.1

```
clear
clc

r = [-1.14697 0.75162 0.34193];
v = [0.65553 0.61048 0.44294];
mu = 1;

[a,emag,i,raan,argp,ta] = rv2oe(r,v,mu)
```

```
a =

    2.4008


emag =

    0.4213


i =

    2.5848


raan =

    2.9736


argp =

    0.8161


ta =

    0.3406
```

Problem 3.2

```
clear
clc
```

```
r = [21807.018 -18320.121 6800.183];
v = [-1.934079 -2.554491 -1.300623];
mu = 398600.4415;


[a,emag,i,raan,argp,ta] = rv2oe(r,v,mu)
```

```
a =

   2.6108e+04


emag =

    0.1284


i =

    2.6926


raan =

    1.9245


argp =

    5.4297


ta =

    2.8526
```

Problem 3.3

```
clear
clc

mu = 398600.4415;
r = [21000*sqrt(2) 21000*sqrt(2) 0];
v = [-0.05*(sqrt(mu/210)) 0.05*sqrt(mu/210) 0];

[a,emag,i,raan,argp,ta] = rv2oe(r,v,mu)
```

```
True anomaly, RAAN, and argument of periapsis are undefined!
Element 6: (0.7854 rads) is actually True Longitude.

a =

       42000
```

```
emag =

     0


i =

     0


raan =

    'undefined'


argp =

    'undefined'


ta =

    0.7854
```

Problem 4.1

```
clear
clc

mu = 398600.4415;
a = 34258.2;
e = 0.11112;
i = deg2rad(152.37);
raan = deg2rad(203.18);
argp = deg2rad(261.49);
ta = deg2rad(260.30);

[r,v] = oe2rv(mu,a,e,i,raan,ta,argp)
```

```
If given angle related to singularities, put in input 7 (argp).

r =

   1.0e+04 *

    2.6352
    2.1668
    0.4997


v =

    1.7959
   -2.4276
   -1.5382
```

Problem 4.2

```
clear
clc

mu = 1;
a = 1.7;
e = 0.12645;
i = deg2rad(46.35);
raan = deg2rad(56.16);
argp = deg2rad(181.41);
ta = deg2rad(4.61);

[r,v] = oe2rv(mu,a,e,i,raan,ta,argp)
```

```
If given angle related to singularities, put in input 7 (argp).

r =

   -0.7334
   -1.2870
   -0.1127


v =

    0.5434
   -0.2638
   -0.6271
```

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