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ECE 8873 Homework 2.3

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```
clear all; close all;
```

Constants

```
rEarth = 6371; % [km]
K = 1;
totalMeteorsPerSec = 158;
trailTime = 0.5; % [seconds]
dataRate = 1; % [kbps]
h = 100; % height above the surface of the Earth[km]
```

Part A

```
Rmax = 2*sqrt(2*K*rEarth*100);

sprintf('3A) Rmax = %2.2f km', Rmax)
```

```
ans =

    '3A) Rmax = 2257.61 km'
```

Part B

```
R = Rmax/2; % radius of circle 1
r = R; % radius of circle 2
d = 500; % distance between centers of circles

d1 = (d^2 - r^2 + R^2) / (2*d);
d2 = d - d1;
overlap = findArea(R,d1) + findArea(r,d2);

SA = 4*pi*(rEarth+h)^2;
meteorsPerSec = overlap/SA * totalMeteorsPerSec;
```

```
sprintf('3B) Meteors Per Second: %2.2f', meteorsPerSec)
```

Part C

```
effDataRate = meteorsPerSec*trailTime*dataRate;

sprintf('3C) Effective Data Rate: %2.2f kbps', effDataRate)
```

```
ans =

    '3C) Effective Data Rate: 0.43 kbps'
```

Area Helper Function

```
function [area] = findArea(R,d)

area = R^2 * acos(d/R) - d*sqrt(R^2 - d^2);

end
```

```
ans =

    '3B) Meteors Per Second: 0.87'
```

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