

A2, Question 4

4:

InitAmp.m:

```
ampx = [4.0,3.0,2.3,1.9,1.0,1.3,2.0,2.8,2.4,1.9,1.0,0.4,0.7,1.6,3.0,4.0];
ampy = [0.4,1.9,3.0,4.0,5.0,6.2,6.8,6.2,5.0,4.0,3.0,2.0,1.0,0.8,1.9,2.4];
```

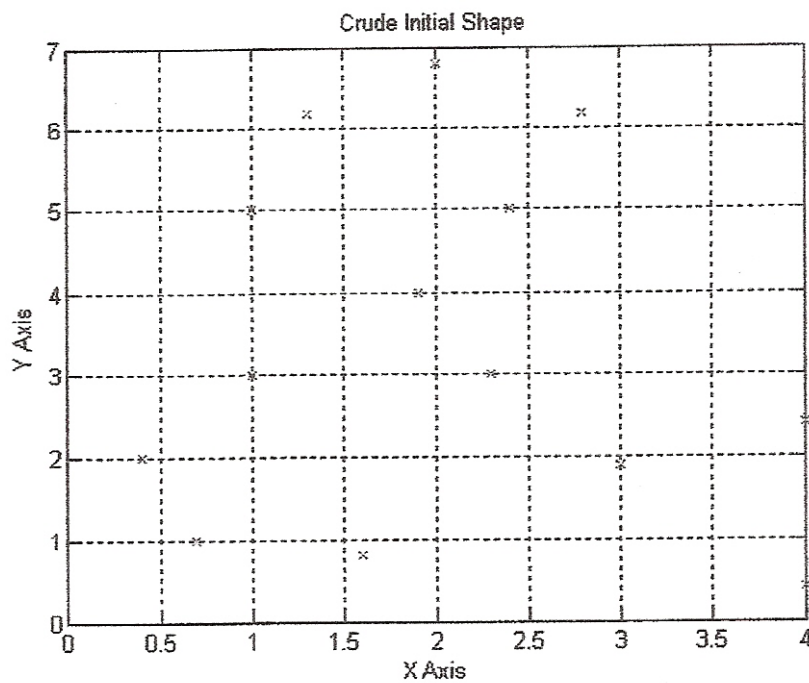
```
ampt = zeros(length(ampx),1);
ampt(1) = 1.0;
for I = 1:(length(ampx)-1)
    ampt(I+1) = ampt(I) + sqrt( ( ampx(I+1)-ampx(I) )^2 + ( ampy(I+1) - ampy(I) )^2 );
end
```

```
xpp = spline(ampt,ampx);
ypp = spline(ampt,ampy);
```

a2q3p1.m:

```
function a2q3p1(ampx,ampy)
```

```
close all;
plot(ampx,ampy,'x');
grid on;
xlabel('X Axis');
ylabel('Y Axis');
title('Crude Initial Shape');
```



a2q3p2.m:

```
function a2q3p2(xpp, ypp, ampt)
```

```
close all;
```

```
tref = zeros(1,3*(length(ampt)-1)+1);
```

```
for k = 1:length(ampt)-1
```

```
    i = 3*(k-1)+1;
```

```
    dt = ampt(k+1) - ampt(k);
```

```
    tref(i) = ampt(k);
```

```
    tref(i+1) = ampt(k)+dt/3;
```

```
    tref(i+2) = ampt(k)+2*dt/3;
```

```
end
```

```
tref(3*(length(ampt)-1)+1) = ampt(length(ampt));
```

```
xr = zeros(length(tref));
```

```
yr = zeros(length(tref));
```

```
for j = 1:length(tref)
```

```
    xr(j) = ppval(xpp,tref(j));
```

```
    yr(j) = ppval(ypp,tref(j));
```

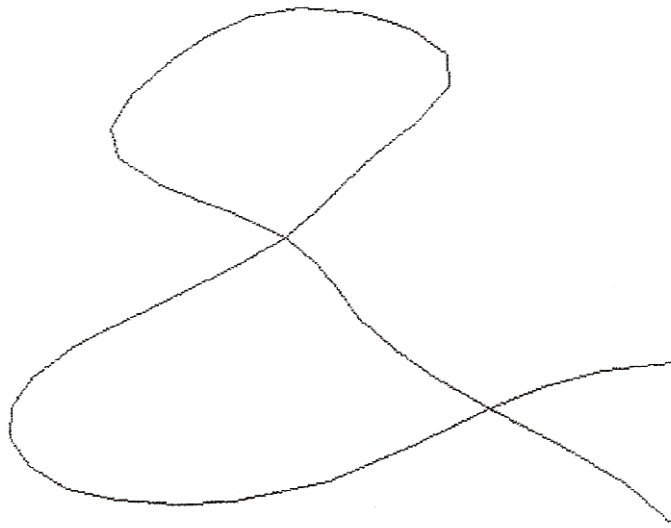
```
end
```

```
plot(xr,yr);
```

```
title('Ampersand - Interpolating Cubic Spline refined by a factor of 3');
```

```
axis off;
```

Ampersand - Interpolating Cubic Spline refined by a factor of 3



```
a2q3p3.m:  
function a2q3p3(xpp, ypp, ampt, ampx, ampy)  
close all;  
tref = zeros(1,5*(length(ampt)-1)+1);  
for k = 1:length(ampt)-1  
    i = 5*(k-1)+1;  
    dt = ampt(k+1) - ampt(k);  
    tref(i) = ampt(k);  
    tref(i+1) = ampt(k)+dt/5;  
    tref(i+2) = ampt(k)+2*dt/5;  
    tref(i+3) = ampt(k)+3*dt/5;  
    tref(i+4) = ampt(k)+4*dt/5;  
end  
tref(5*(length(ampt)-1)+1) = ampt(length(ampt));  
xr = zeros(length(tref));  
yr = zeros(length(tref));  
for j = 1:length(tref)  
    xr(j) = ppval(xpp,tref(j));  
    yr(j) = ppval(ypp,tref(j));  
end  
plot(xr,yr);  
hold on;  
plot(ampx,ampy);  
title('Interpolating Cubic Spline refined by a factor of 5 vs. Piecewise Linear Interpolating Curve');  
axis off;
```

Interpolating Cubic Spline refined by a factor of 5 vs. Piecewise Linear Interpolating Curve

