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ESC HW Problem # 19

A)

Code is seen below-

```
x = linspace(-1, 1, 101)
y = exp(1./(x.^2 - 1));
y(1) = 0;
y(length(y)) = 0;

p = polyfit(x, y, 10)
x1 = linspace(-1, 1);
y1 = polyval(p, x1);
plot(x, y, 'o', x1, y1, 'b-')
```

Output coefficients and plot seen below-

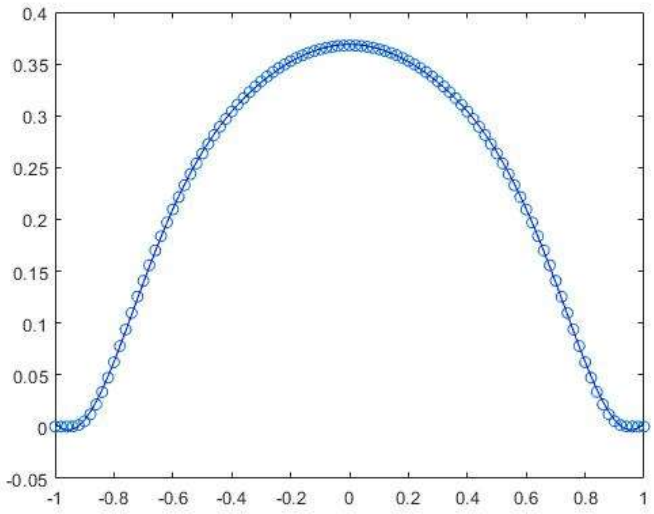
```
p =

Columns 1 through 8

        -1.1247   -0.0000    3.1281    0.0000   -2.4430   -0.0000    0.5089    0.0000

 Columns 9 through 11

        -0.4350   -0.0000    0.3689
```



B) Code is seen below-

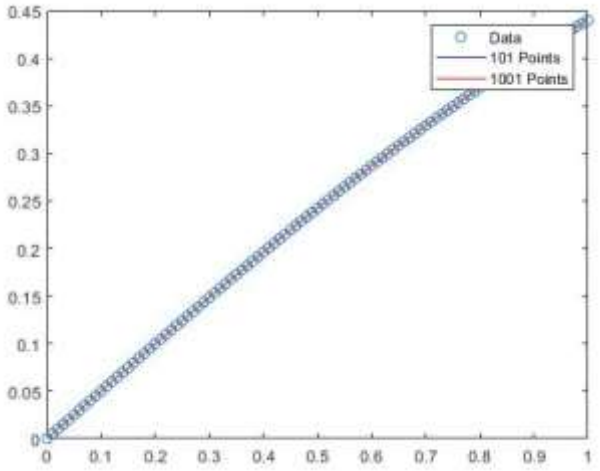
```
x = linspace(0, 1, 101);
y = besselj(1,x);
xx = linspace(0, 1, 1001);
yy = besselj(1, xx);

p = polyfit(x, y, 8);
x1 = linspace(0, 1);
y1 = polyval(p, x1);

pp = polyfit(xx, yy, 8);
yy1 = polyval(pp, x1);

plot(x, y, 'o', x1, y1, 'b-', x1, yy1, 'r-')
legend('Data', '101 Points', '1001 Points')
```

Plot seen below-



Since there is so little different between the two different approximations, I showed that the two lines are different by comparing by subtracting the two and printing out the difference:

```
diff1 = y(floor(length(y)/2)) - yy(floor(length(yy)/2))
diff2 = y(floor(length(y)/3)) - yy(floor(length(yy)/3))
diff3 = y(floor(length(y)/4)) - yy(floor(length(yy)/4))
```

Which outputs:

```
diff1 =

   -0.0041

diff2 =

   -0.0058

diff3 =

   -0.0044
```