Exercise Set 10

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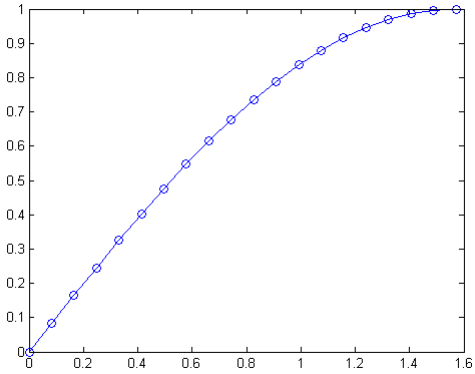
Using Matlab for quadratic approximation

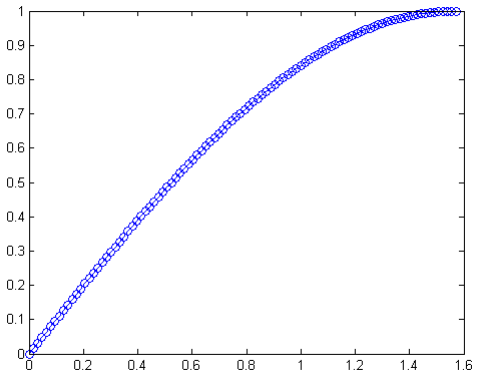
Sample $\sin(x)$

```
function sin()

n = 100;

x = linspace(0,pi/2,n)';
y = sin(x);
figure
plot(x , y, 'o-');

end
```

20 Data Points $[0, \frac{\pi}{2}]$



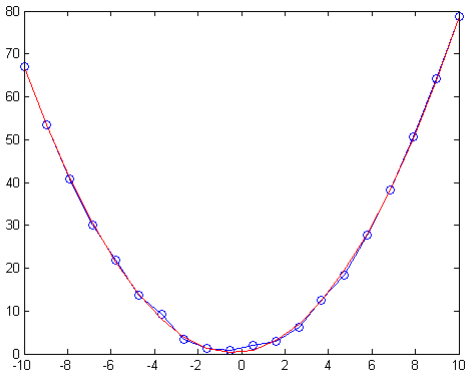
100 Data Points [0, $\frac{\pi}{2}$]

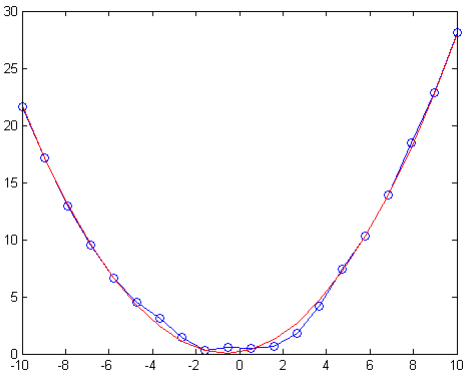


best fit quadratic polynomial

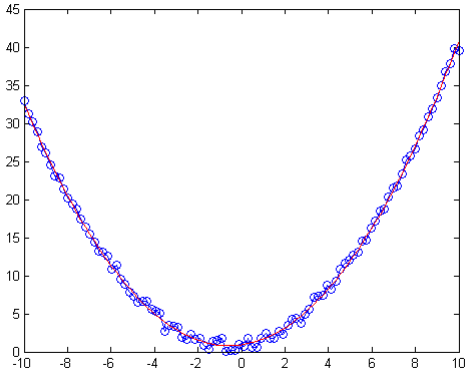
```
function [B,C, y2] = qfit()

n = 100;

x = linspace(-10,10,n)';
one = ones(size(x));
x2 = x.^2;

A = [one x x2];

B = A'*A;

y = x2*rand + x*rand + rand*one + .5*randn(size(x));

C =inv(B)*(A'*y);

y2 = x2*C(3)+x*C(2)+C(1);

plot(x , y, 'o-', x, y2, '-r' );

end
```

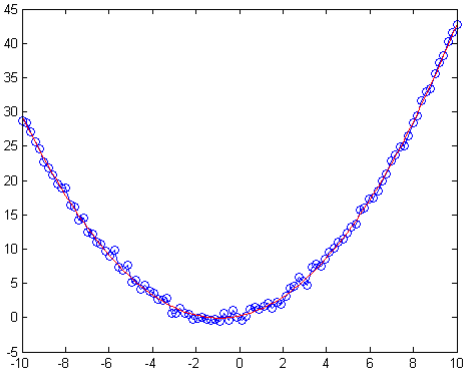
20 Data Points





100 Data Points





Quadratic approximation for $\sin(x)$

```
function sin()

n = 100;

x = linspace(0,pi/2,n)';
one = ones(size(x));
x2 = x.^2;
```

```
A = [one x x2];

B = A'*A;

y = sin(x) + .08*randn(size(x)); %noise added with randn

C =inv(B)*(A'*y);

y2 = x2*C(3)+x*C(2)+C(1);

figure
plot(x , y, 'o-', x ,y2, '-r');

end
```

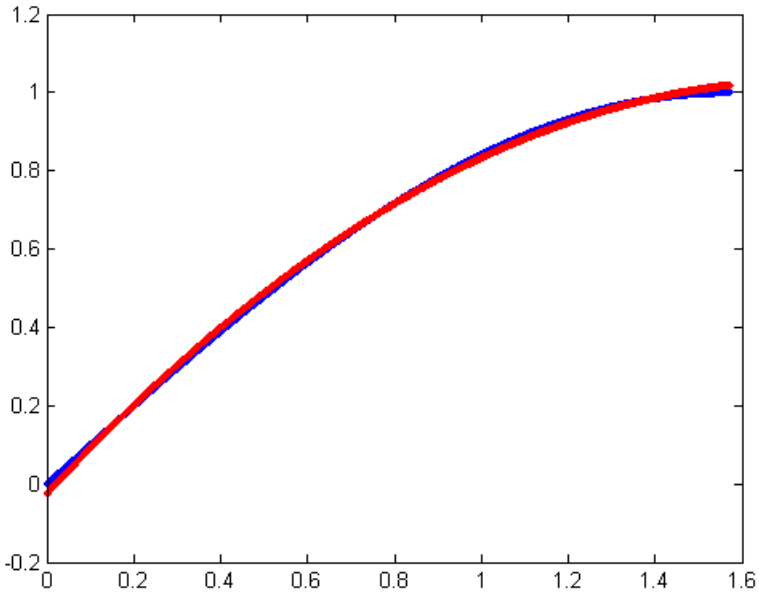
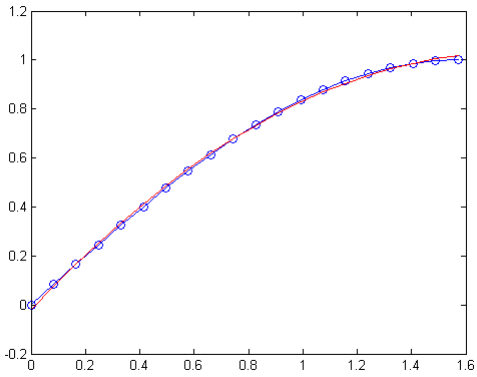
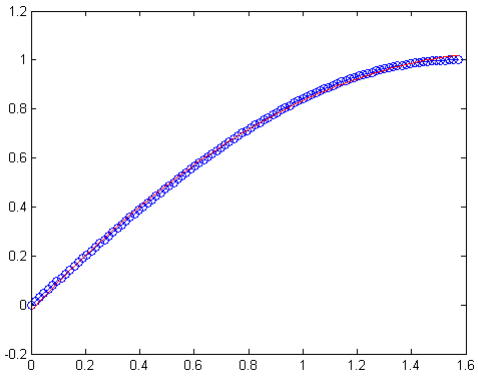


Figure 1: Red = Quadratic Fit, Blue is continuous sine function

With out Noise





With Normally Distributed Noise