

Exercise Set 9

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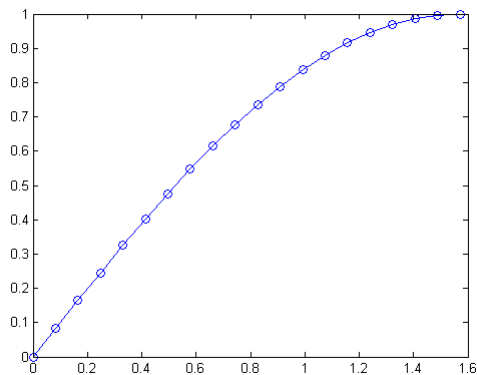
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Using Matlab for quadratic approximation

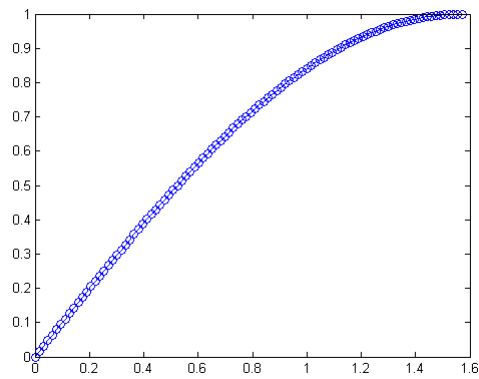
Sample $\sin(x)$

```
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));
```

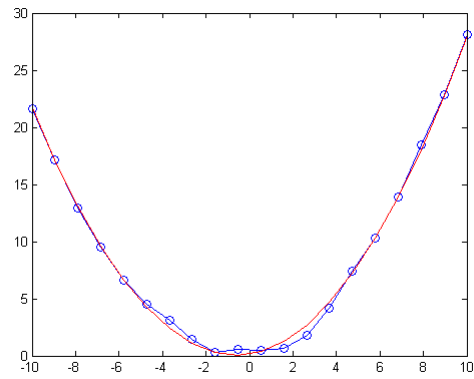
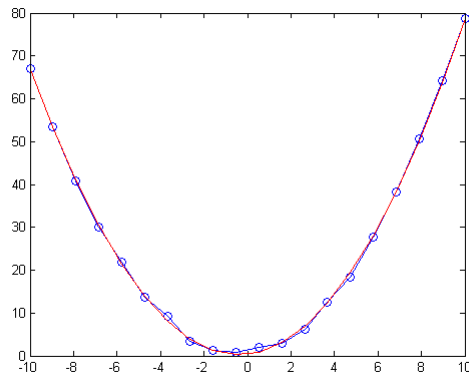
```
C =inv(B)*(A'*y);
```

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

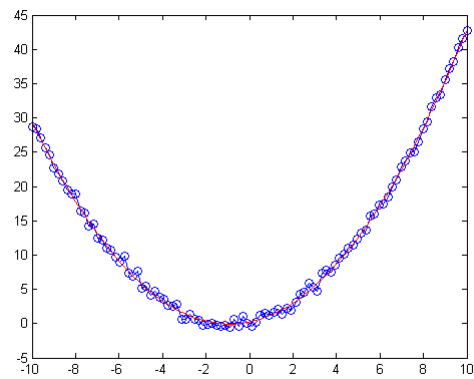
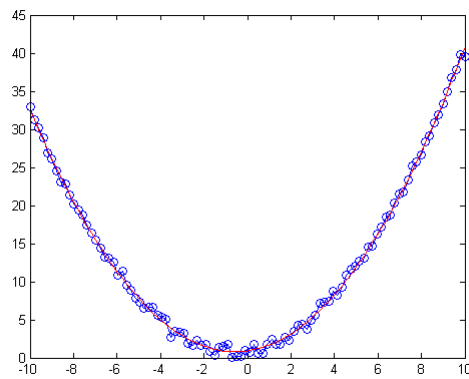
```
plot(x , y, 'o-', x, y2, '-r' );
```

```
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

```

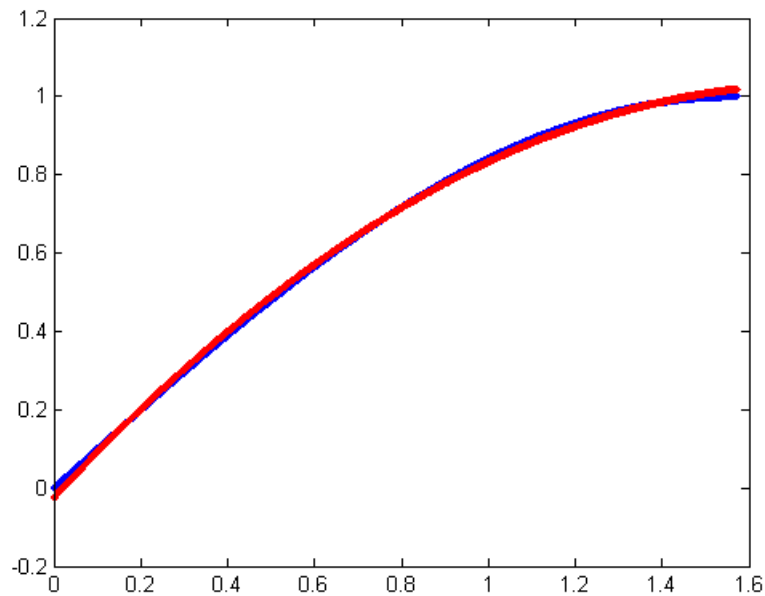
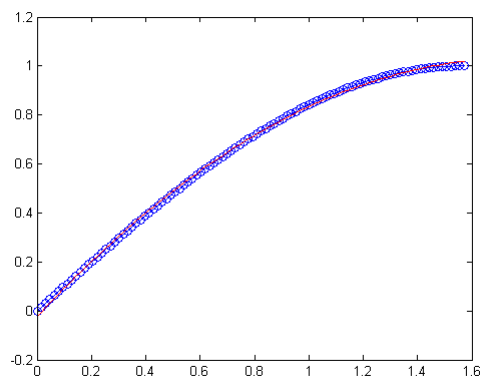
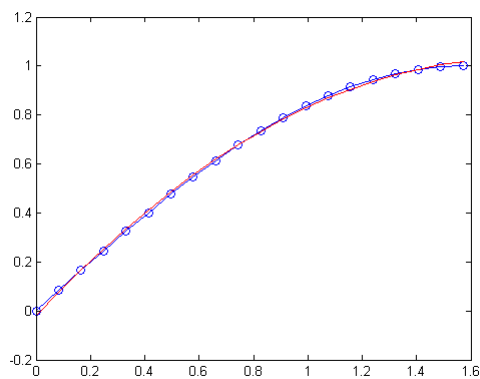


Figure 1: Red = Quadratic Fit, Blue is continuous sine function

With out Noise



With Normally Distributed Noise

