Lab Assignment 2

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# Question 1: Optimizing parameters

1

```
parabolic_inter = function(a,x){
  a0 = a[1]
  a1 = a[2]
  a2 = a[3]
  res = a0 + a1*x + a2*(x^2)
  return(res)
}
sum_square_error = function(a,x,func){
  x0 = x[1]
  x1 = x[2]
  x2 = x[3]
  res = sum((func(x0)-parabolic_inter(a,x0))^2,(func(x1)-parabolic_inter(a,x1))^2,(func(x2)-parabolic_in
  return(res)
}
opt = function(x,func){
  a = c(0,1,-1)
  res = optim(a,sum_square_error,x = x,func = func)
  res = res$par
  return(res)
}
```
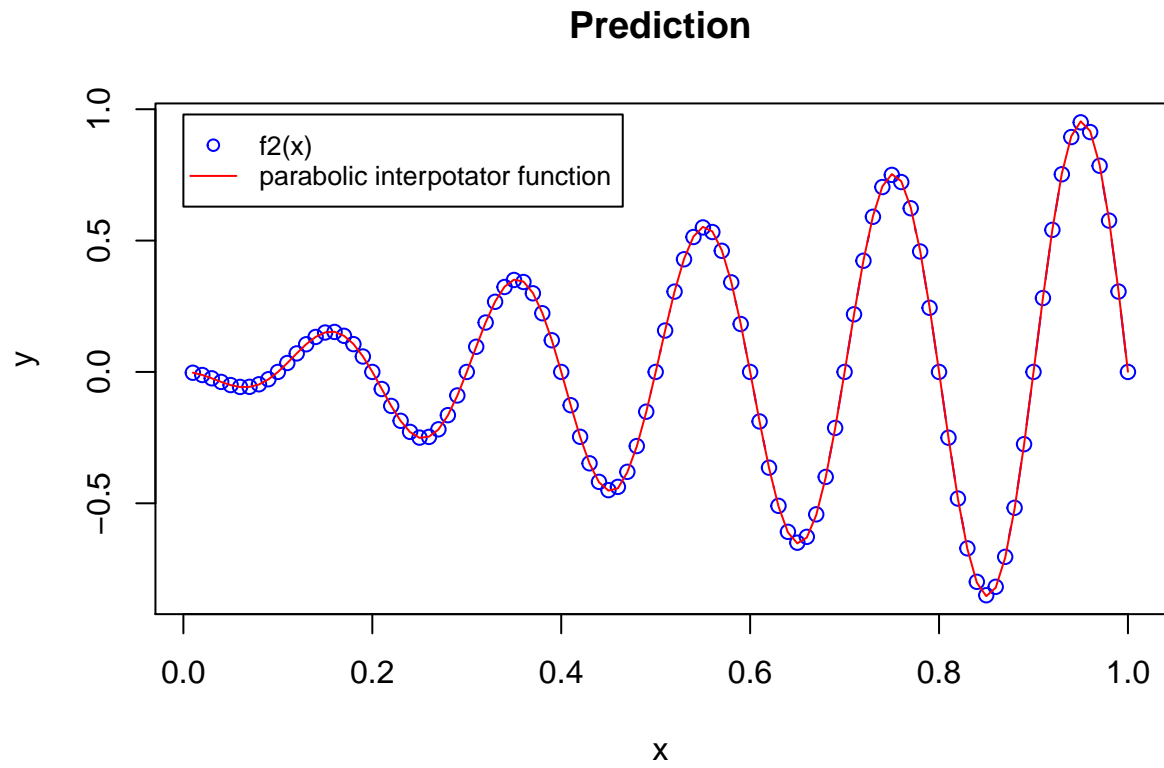
2

```
approx = function(n,func){
 midpoint = 1/(2*n)
 res = data.frame()
 for(i in 1:n){
   x = c(((i-1)/n),((i/n)-midpoint),(i/n))
   res = append(res,as.data.frame(opt(x,func)))
 }
 return(res)
}
```

3

Comparing the result from f1(x) and parabolic interpolator function for 100 subintervals.
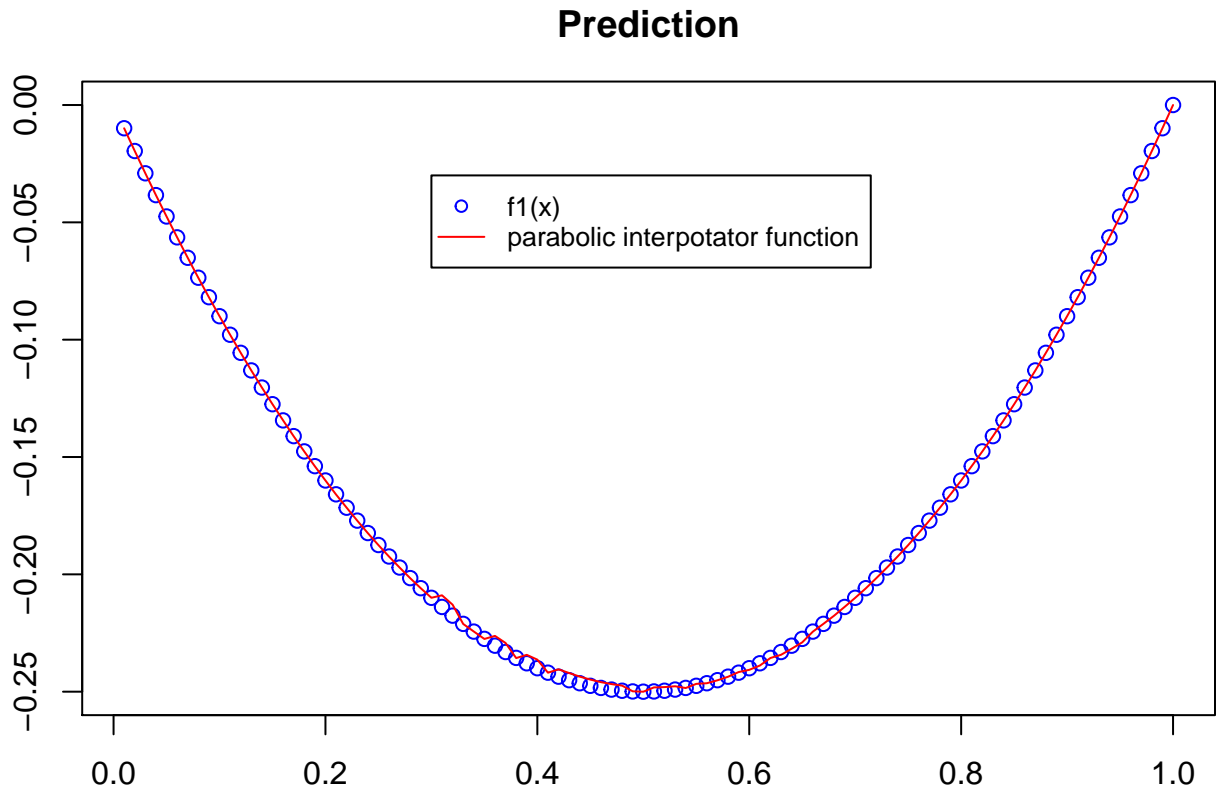
Prediction

Comparing the result from f2(x) and parabolic interpolator function for 100 subintervals.

Prediction

Observing the above two plots , we can say that the prediction from piecewise parabolic interpolater was fair as the predictions has low errors.