

[Self] Chapter15-practice (Lec10) [ALL CORRECT]

```
xtest = 6;
x1test = 1.5;
x2test = 1.5;
```

Linear

Fit a line to the following data:

x = [3 4 5 7 8 9 11 12]';

y = [6.9 10.0 11.1 15.0 15.7 16.2 24.0 27.5]';

Determine the r^2 and $s_{y/x}$.

Use the least-squares fit to predict the value of y when x = 6.

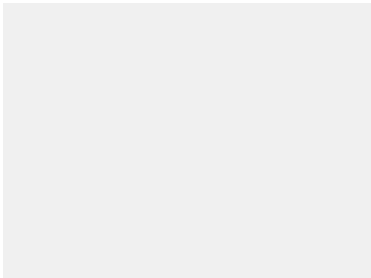
Rounding a decimal number to four decimal places.

r^2 =

$s_{y/x}$ =

x = 6, y =

```
xL = [3 4 5 7 8 9 11 12]';
yL = [6.9 10.0 11.1 15.0 15.7 16.2 24.0 27.5]';
[aL, r2L] = linregr(xL, yL)
```



```
aL = 1x2
    2.0900    0.3861
r2L =
    0.9494
```

```
resL = yL - aL(2) - (aL(1) .* x)
```

```
resL = 8x1
    0.2438
    1.2538
    0.2638
   -0.0162
   -1.4063
   -2.9963
    0.6237
    2.0337
```

```
srL = sum(resL .^ 2)
```

```
srL =
17.1814
```

```
syxL = sqrt(srL / (length(xL) - 2)) % "2" comes from "degree + 1"
```

```
syxL =
1.6922
```

```
ypredL = aL(2) + (aL(1) .* xtest) % no residuals needed
```

```
ypredL =
12.9262
```

Quadratic

Fit a quadratic to the following data:

$x = [3\ 4\ 5\ 7\ 8\ 9\ 11\ 12]'$;

$y = [40\ 88\ 110\ 200\ 290\ 347\ 510\ 625]'$

Determine the r^2 and $s_{y/x}$.

Use the least-squares fit to predict the value of y when x = 6.

Rounding a decimal number to four decimal places.

$r^2 =$

$s_{y/x} =$

x = 6, y =

nQ = 2

nQ =
2

xQ = [3 4 5 7 8 9 11 12]';
yQ = [40 88 110 200 290 347 510 625]';
pQ = polyfit(xQ, yQ, n)

pQ = 1×3
4.4384 -3.0965 16.6925

valQ = polyval(pQ, xQ)

valQ = 8×1
47.3487
75.3211
112.1704
212.4994
275.9791
348.3357
519.6793
618.6663

srQ = sum((yQ - valQ).^2)

srQ =
707.8754

stQ = sum((yQ - mean(yQ)).^2)

stQ =
3.0617e+05

r2Q = 1 - (srQ/stQ)

r2Q =
0.9977

syxQ = sqrt(srQ / (length(yQ) - (n+1)))

syxQ =
11.8985

ypredQ = polyval(pQ, xtest)

ypredQ =
157.8965

Multiple

Use multiple linear regression to fit the following data:

$x1 = [1\ 1\ 1\ 2\ 2\ 2\ 3\ 3\ 3]'$;

$x2 = [1\ 2\ 3\ 1\ 2\ 3\ 1\ 2\ 3]'$;

$y = [10.5\ 13.9\ 15.1\ 11.5\ 14.7\ 18.9\ 14.2\ 18.5\ 20.1]'$;

Determine the r^2 and $s_{y/x}$.

Use the least-squares fit to predict the value of y when x1 = 1.5 and x2 = 1.5

Rounding a decimal number to four decimal places.

$r^2 =$

$s_{y/x} =$

x1 = 1.5, x2 = 1.5, y =

x1 = [1 1 1 2 2 2 3 3 3]';
x2 = [1 2 3 1 2 3 1 2 3]';

```
y = [10.5 13.9 15.1 11.5 14.7 18.9 14.2 18.5 20.1]';
Z = [ones(size(y)) x1 x2] % has ones() because we're using the default polynomial expression (not
specified otherwise)
```

```
Z = 9x3
    1    1    1
    1    1    2
    1    1    3
    1    2    1
    1    2    2
    1    2    3
    1    3    1
    1    3    2
    1    3    3
```

```
a = (Z' * Z) \ (Z' * y) % the coefficient vector
```

```
a = 3x1
    4.8667
    2.2167
    2.9833
```

```
st = sum((y - mean(y)).^2)
```

```
st =
    87.2800
```

```
sr = sum((y - Z*a).^2)
```

```
sr =
    4.3967
```

```
r2 = 1 - (sr/st) % coefficient of determination
```

```
r2 =
    0.9496
```

```
syx = sqrt(sr / (length(y) - length(a)))
```

```
syx =
    0.8560
```

```
ypredM = a(1) + (a(2) * x1test) + (a(3) * x2test)
```

```
ypredM =
    12.6667
```