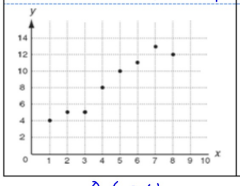
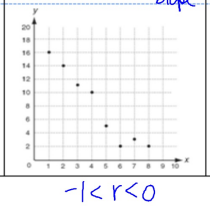
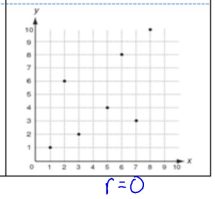
notes 1-4 Sept. 9

Curve Fitting with Linear Models

Use a scatter plot to identify a correlation. If the variables appear correlated, then find a line of fit

Positive correlation	Negative correlation	No correlation
pos. slope	neg slope	
		
$0<r<1$	$-1<r<0$	$r=0$

Example: The table shows the relationship between two variables. Identify the correlation, sketch a line of fit, and find its equation.

x	1	2	3	4	5	6	7	8
y	16	14	11	10	5	2	3	2

Step 1 Make a scatter plot of the data.
What type of correlation? Negative

Step 2 Use a straightedge to draw a line.
There will be some points above and below the line.

Step 3 Choose two points on the line to find the equation:
(1, 16) and (7, 2).

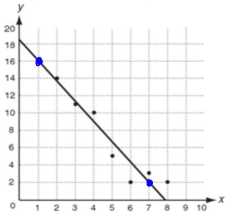
Step 4 Use the points to find the slope:

$$m=\frac{y_2-y_1}{x_2-x_1}=\frac{2-16}{7-1}=\frac{-14}{6}=\frac{-7}{3}$$

Step 5 Use the point-slope form to find the equation of a line that models the data.

$y-y_1=m(x-x_1)$

$$y=\frac{-7}{3}x+\frac{55}{3}$$



$$y-2=\frac{-7}{3}(x-7)$$

$$y=\frac{-7}{3}x+\frac{49}{3}+\frac{6}{3}$$

A line of best fit can also be used to predict data. Use your equation of a line to predict the value of y when $x = 2.4$.

$$y=\frac{-7}{3}(2.4)+\frac{55}{3}$$

interpolation: predict data & X is within domain of graph

$$-7(.8)+\frac{55}{3}$$

$$-\frac{56}{10}+55/3=\frac{-56(3)+55(10)}{30}=\frac{382}{30}\approx 12.7$$

We use the correlation coefficient, r, to measure how well the data fits.

$-1 \le r \le 1$

If r is near -1, data is modeled by a line with a negative slope.

If r is near 1, data is modeled by a line with a positive slope.

If r is near 0, data has no correlation.

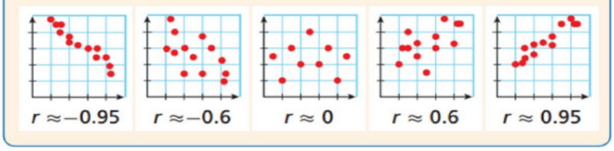
Properties of the Correlation Coefficient r

r is a value in the range $-1 \le r \le 1$.

If $r = 1$, the data set forms a straight line with a positive slope.

If $r = 0$, the data set has no correlation.

If $r = -1$, the data set forms a straight line with a negative slope.



Completing the Square

Trinomial squares $A^2+2AB+B^2=(A+B)^2$

$A^2-2AB+B^2=(A-B)^2$

Solve $\frac{3x^2-12x-6=0}{3}$ by CTS

$x^2-4x-2=0$

$\left(\frac{-4}{2}\right)^2$ $x^2-4x+4=2+4$

$A^2-2(x)(2)+B^2$

$\sqrt{(x-2)^2}=\sqrt{6}$

$x-2=\pm\sqrt{6}$

$x=2\pm\sqrt{6}$