

Polynomial Functions

For n , a non-negative integer with a_0, a_1, \dots, a_n real numbers then:

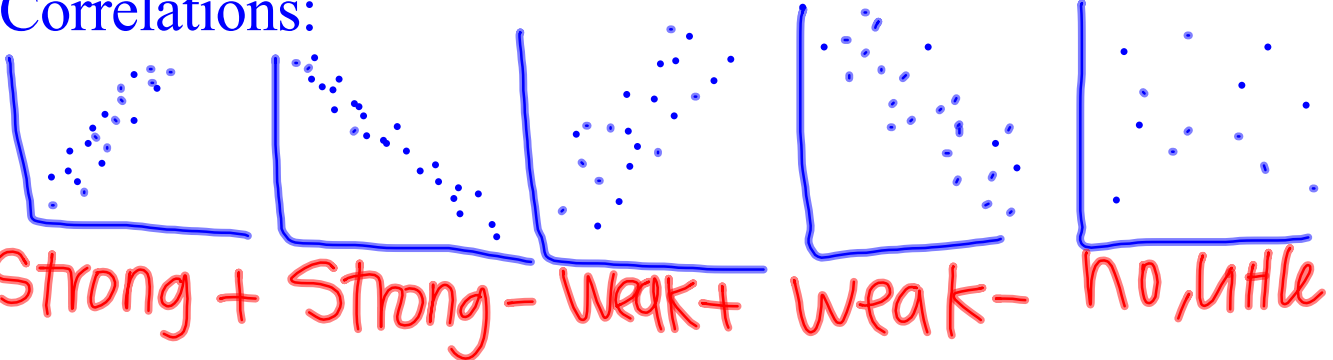
$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_0$$

is a Polynomial Function of degree n with a leading coefficient a_n

2.1 Linear & Quad. Functions

Regression Equations: $-1 \leq r \leq 1$

Correlations:



Forms of equations:

slope - intercept

$$y = mx + b$$

standard form

$$Ax + By = C$$

point slope

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

Writing Equations of Lines

$$y = mx + b$$



Find the eq of the line given: $f(1)=3$

$$(1, 3) \quad (3, 7)$$

$$f(3)=7$$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7 - 3}{3 - 1} = \frac{4}{2} = 2$$

$$y - 3 = 2(x - 1)$$

$$y - 3 = 2x - 2$$

$$+3 \quad +3$$

$$y = 2x + 1$$

Average Rate of Change

Linear functions have a constant non-zero rate of change

The average rate of change of a function $y = f(x)$ between $x = a$ and $x = b$ is:

$$\frac{f(b) - f(a)}{b - a}$$

Find the average rate of change of
 $f(x) = 3x + 7$ between $x = 3$ and $x = 9$

$$\frac{f(9) - f(3)}{9 - 3} = \frac{3 \cdot 9 + 7 - (3 \cdot 3 + 7)}{6} = \frac{34 - 16}{6}$$

$$\frac{18}{6} = \boxed{3}$$

Quadratic Equations:

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Standard Form:

$$y = \underline{ax^2 + bx + c}$$

Graphing or Vertex Form:

$$y = \underline{a(x - h)^2 + k}$$

vertex: (h,k)

axis of symmetry x=h

how do you change from standard to vertex form???

Completing the Square

process used to write an eq. in graphing form

Steps:

1. make sure eq. is in the form: $y = ax^2 + bx + c$

2. write eq. w/ blanks for missing terms to be added:

$$y + _ _ = ax^2 + bx + _ _ + c$$

3. Put () around: $(ax^2 + bx + _ _)$

4. Factor out "a" from ax^2 & bx terms: $y + _ = a(x^2 + \frac{b}{a}x + _ _) + c$

5. write eq. in perfect sq. form w/ blanks: $y + _ = a(x + _)^2 + c$

6. divide $\frac{b}{a}$ in half & write in 2nd blank of step #5

7. square the # from step 6 & write in 2nd blank from step #4

8. Multiply # from step 7 by "a" & write in all remaining blanks

9. Simplify

$$y = -2x^2 + 6x + 1$$

$$y = x^2 + 4x - 7$$

$$\boxed{\frac{4}{2}} = 2^2 = 4$$

$$y + 7 + 4 = x^2 + 4x + 4$$

$$y + 11 = (x + 2)^2$$

$$V: (-2, -11)$$

$$y = (x + 2)^2 - 11$$

$$A: x = -2$$

$$y = 3x^2 + 4x - 2$$

$$\frac{\frac{4}{3}}{2} = \left(\frac{4}{6}\right)^2 = \frac{16}{36}$$

$$y + 2 + \underline{\quad} = 3x^2 + 4x$$

$$y + \frac{16}{3} + \frac{4}{3} = 3\left(x^2 + \frac{4}{3}x + \frac{16}{36}\right)$$

$$\frac{3 \cdot 4}{9} y + \frac{10}{3} = 3\left(x + \frac{4}{6}\right)^2$$

$$y = 3\left(x + \frac{4}{6}\right)^2 - \frac{10}{3}$$

$$V: \left(-\frac{4}{6}, -\frac{10}{3}\right)$$

$$A: x = -\frac{2}{3}$$

Writing Quadratic Equations

2 points

steps:

1. start w/ graphing form $y = a(x - h)^2 + k$

2. put the vertex in for (h, k)

3. put 2nd pt in for (x, y)

4. solve for a

5. write the equation in graphing form using "a" & (h, k)

Write the eq. of the parabola w/ vertex $(-2, -3)$ & point $(-4, -5)$

$$y = a(x-h)^2 + k$$

$$-5 = a(-4+2)^2 - 3$$

$$-5 = a(-2)^2 - 3$$

$$-5 = 4a - 3$$

$$\frac{-2}{4} = \frac{4a}{4}$$

$$a = -\frac{1}{2}$$

$$y = -\frac{1}{2}(x+2)^2 - 3$$

Formula for vertical free fall:

$$h = -16t^2 + v_0 t + h_0$$

Write an equation to model the path of a ball if a baseball player throws it with an initial velocity of 85 ft/sec. from a height of 5.5 feet.

What is the maximum height the baseball will reach? How many seconds will it take to reach that height?

$$h = -16t^2 + 85t + 5.5$$

118ft 2.6 sec.

