## TOPIC: PREDICTION INTERVALS

### Prediction Intervals

◆ Recall: You can predict $y$-values using a regression line.

► A **prediction interval** is like a confidence interval for a single *predicted* $y$-value.

**EXAMPLE**

The data below shows ice cream sales ($y$) in dollars from a local ice cream stand & the daily high temperature ($x$) in °F for 1 week. Use the given regression line to make a 95% prediction interval for the sales when the temperature is $x_0 = 86$°F.

| High Temp ($x$) | 83 | 61 | 69 | 79 | 77 | 70 | 90 |
|---|---|---|---|---|---|---|---|
| Sales ($y$) | 7462 | 914 | 4793 | 6712 | 5423 | 2854 | 9327 |

$x_0 =$ _____

$\hat{y}_0 =$ _____

$n =$ _____

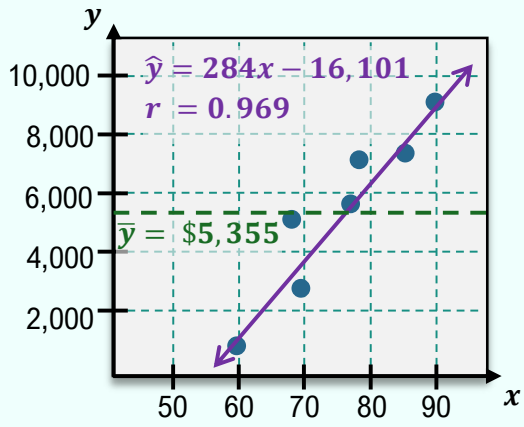
$t_{\alpha/2} =$ _____

$s_e =$ _____

$\bar{x} =$ _____

$\Sigma x =$ _____

$\Sigma x^2 =$ _____




We are ___% confident that when the temperature is 86°F, ice cream sales will be between _____ & _____.

**HOW TO: Make a Prediction Int. on TI-84**

**1)** Verify: **strong** linear correlation ☐

*AND* $x$-val **inside** range ☐

**2)** Point Estimate: plug ___ into ___ eqn

**3)** Critical Val. (use table/calculator): $t_{\alpha/2}$

$*df = n - 2$

**4)** Find Standard Error

STAT > to **TESTS**

**F:LinRegTTest**

b) **s = Standard Error** ($s_e$)

**5)** Find $\bar{x}$, $\Sigma x$, & $\Sigma x^2$

STAT > to **CALC**

**1:1-Var Stats**

b) **List:** ___

**6)** Margin of Error $E$

**7)** Find upper & lower bounds

$(\hat{y}_0 - E, \hat{y}_0 + E)$

**New**

$$E = t_{\alpha/2} \cdot s_e \sqrt{1 + \frac{1}{n} + \frac{n(x_0 - \bar{x})^2}{n\Sigma x^2 - (\Sigma x)^2}}$$

*(Margin of Error for Prediction Intervals)*

## TOPIC: PREDICTION INTERVALS

### PRACTICE

A linear regression model predicts weekly revenue from ad spending. You find the prediction interval for exactly \$200 in ad spending is $(\$520, \$610)$. Choose the answer that best describes what this interval means.

**A)** The model will generate at least \$520 in revenue.
**B)** The average revenue for \$200 in ad spending is exactly \$565**.**
**C)** We are 95% confident that a single weekly revenue value with \$200 in ad spending will fall between \$520 and \$610.
**D)** We are 95% confident the mean revenue from \$200 in ad spending is between \$520 and \$610.