Which Confidence Interval or Test Should I Use?

1. Mean – single sample – known σ or large sample ($n \geq 30$)
2. Mean – single sample – unknown σ (any sample size)
3. Means – two samples – matched pairs differences (any sample size)
4. Means – two samples – known $\sigma's$ or large samples ($n_1 \geq 30, n_2 \geq 30$)
5. Means – two samples – unknown $\sigma's$ (equal or different, any sample size)
6. Mean – two samples – unknown $\sigma's$ (equal σ_1=σ_2, any sample size)
7. Proportion – single sample (large sample)
8. Proportions – two samples (large samples)

Means or Proportions?

- Means: Data are continuous random variables (usually normally or approximately normally distributed with unknown mean)
  (Tests 1-6)
- Proportions: Data are counting "successes" following a binomial distribution
  (Tests 7-8)

Single or Two Samples?

- Means:
  Single Sample (Tests 1-2)
  Two Samples: (Tests 3-6)
- Proportions:
  Single Sample (Test 7)
  Two Samples: (Test 8)

If Two Samples: Matched Pairs or Independent Samples?

- Means:
  Matched Pairs: (Test 3)
  Independent Samples: (Tests 4-6)

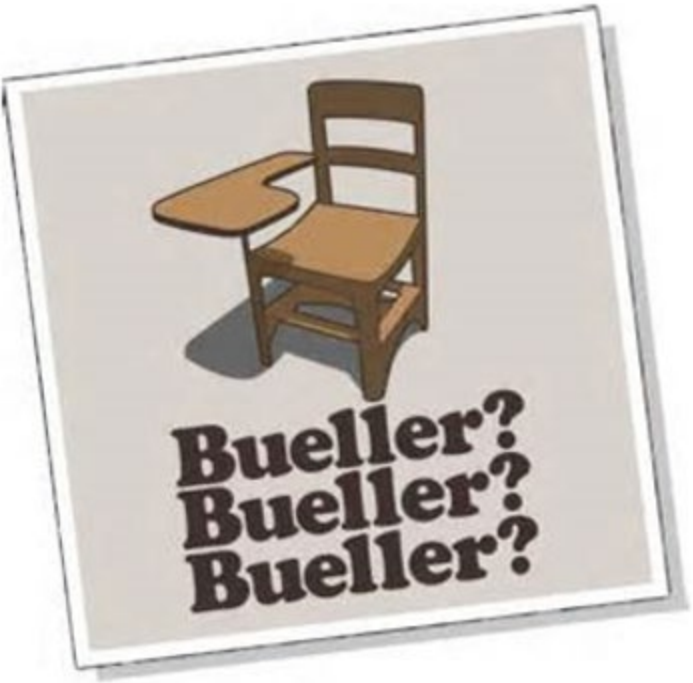
- Proportions:
  Matched Pairs: (N/A)
  Independent Samples: (Test 8)

Standard Deviations: Known or Unknown (Population or Estimated from Samples)?

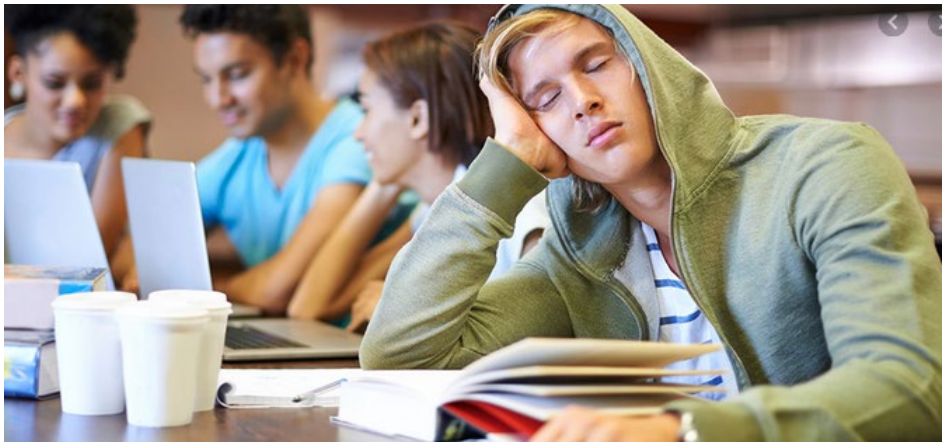
- Means:
  - Known Standard Deviation(s):
    - Single Sample: (Test 1)
    - Matched Pairs: (N/A)
    - Two Samples: (Test 4)
  - Unknown Standard Deviation(s)
    - Single Sample: (Test 2)
    - Matched Pairs: (Test 3)
    - Two Samples: (Test 5 if no assumptions about σ_1 and σ_2)
    - Two Samples: (Test 6 if assuming $\sigma_1 = \sigma_2$)

- Proportions:
  Not Applicable: Standard deviations are always calculated (estimated) using p.
  Single Sample (Test 7)
  Two Samples: (Test 8)

CASE : Does Class Attendance Matter?



- In a MATH 142 (Precalculus II) class students with attendance (less than 5 absences) are compared to student with low attendance (5 or more absences).
- Does the data provide evidence that attendance improves final score?



CASE : Does Class Attendance Matter?

High Attendance	Low Attendance
73.2	60.2
67.8	76.2
85	23
74	80.8
63.2	27.4
70.8	61.4
63	80.2
65.8	55.6
74.8	55.6
77.4	62.2
77.6	62.2
82.4	57.6
90.4	82.2
70.6	81.8
	55
	73.4
	62.8
	62
	71.4
	60
	75.2
	59.4

$\bar{x}_1 = 74.00$ $s_1 = 8.09$ $n_1 = 14$

$\bar{x}_2 = 62.98$ $s_2 = 15.34$ $n_2 = 22$

Final Score (percentage)

CASE : The 50 State Golf Marathon

- In 2005, three enthusiastic golfers from Spokane (Jack Hebner, Roger Crum and Arlie Hansen) set out on a journey to accomplish an ambitious goal: **To play 50 rounds of golf in 50 states in 30 days!**
- Their journey started on the Creek at Qualchan Golf Course in Spokane on June 1, 2005.
- 2 of the 3 golfers accomplished their goal and finished their 900th hole at the Kona Country Club in Hawaii on June 30, 2005.

Date	Course	Location	Tee Time	Jack's Score	Roger's Score	Arlie's Score
June 1st	The Creek at Qualchan	Spokane, WA	5:00 a.m.	88	99	107
June 1st	Wildhorse Resort	Pendleton, OR	2:30 p.m.	85	85	91
June 2nd	Scotch Pines Golf Course	Payette, ID	6:30 a.m.	83	--	90
June 3rd	Northstar at Tahoe Resort	Truckee, CA	6:30 a.m.	87	--	97
June 3rd	The Edgewood Tahoe Golf	Stateline, NV	1:00 p.m.	92	--	99
June 4th	Sunbrook Golf Course	St. George, UT	8:40 a.m.	90	--	100
June 4th	Lake Powell National Golf	Page, AZ	3:00 p.m.	85	--	91
June 5th	Pinon Hills Golf Course	Farmington, NM	9:30 a.m.	89	--	89
June 5th	Dalton Ranch Golf Club	Durango, CO	3:00 p.m.	86	--	95
June 6th	Sunset Hills Golf Course	Guymon, OK	4:30 p.m.	83	--	91
June 7th	Willow Tree Golf Course	Liberal, KS	7:30 a.m.	83	--	91
June 7th	Hidden Hills Public Golf	Pampa, TX	1:00 p.m.	85	--	95
June 8th	Stonebridge Meadows Golf	Fayetteville, AR	7:00 a.m.	89	--	101
June 8th	Bootheel Golf Club	Sikeston, MO	5:00 p.m.	86	--	95
June 9th	Frances E. Miller Golf	Murray, KY	6:30 a.m.	87	--	92
June 9th	Quail Ridge Golf Course	Bartlett, TN	3:30 p.m.	85	--	91
June 10th	Carter Plantation	Springfield, LA	9:20 a.m.	90	--	96
June 10th	Windance Country Club	Gulfport, MS	3:00 p.m.	92	--	99
June 11th	Quail Heights Country Club	Lake City, FL	7:00 a.m.	83	--	92
June 11th	Francis Lake Golf Club	Lake Park, GA	11:30 a.m.	86	--	89
June 12th	Cane Creek Golf Club	Anniston, AL	7:30 a.m.	91	--	98
June 12th	Boscobel Golf Club	Pendleton, SC	1:30 p.m.	83	--	88
June 13th	Reems Creek	Weaverville, NC	7:33 a.m.	87	--	90
June 13th	Hanging Rock	Salem, VA	3:30 p.m.	83	--	93
June 14th	Locust Hill Golf Course	Charles Town, W.	6:00 a.m.	84	--	94
June 14th	Westwinds Golf Club	New Market, MD	11:00 a.m.	84	--	84
June 14th	Three Little Bakers Country	Wilmington, DE	5:30 p.m.	88	92	93
June 15th	Limekiln Golf Club	Ambler, PA	6:30 a.m.	80	85	90
June 15th	Tamarack Golf Course	East Brunswick, NJ	1:30 p.m.	82	88	94
June 16th	Yale Golf Course	New Haven, CT	9:10 a.m.	89	91	97
June 16th	Green Valley Country Club	Portsmouth, RI	5:00 p.m.	88	87	91
June 17th	Hickory Hills Golf Course	Methuen, MA	6:30 a.m.	89	88	96
June 17th	Campbells Scottish Highland	Salem, NH	12:00 p.m.	88	92	95
June 19th	Cape Arundel Golf Course	Kennebunkport, ME	6:00 a.m.	90	87	95
June 19th	Mt. Anthony Country Club	Bennington, VT	3:00 p.m.	87	--	92
June 20th	Domenicos Golf Course	Whitesboro, NY	6:30 a.m.	84	--	93
June 21st	Pine Ridge Country Club	Vickliffe, OH	6:10 a.m.	79	--	90
June 21st	Island Hills Golf Course	Centreville, MI	4:30 p.m.	86	--	94
June 22nd	Blackthorn Golf Club	South Bend, IN	6:30 a.m.	88	--	94
June 22nd	Winnetka Golf Club	Winnetka, IL	3:00 p.m.	88	--	91
June 23rd	The Bridges Golf Course	Madison, WI	6:30 a.m.	89	--	97
June 24th	The Meadows Golf Course	Moorhead, MN	6:30 a.m.	83	--	93
June 24th	Rose Creek Golf Course	Fargo, ND	12:00 p.m.	84	--	93
June 25th	Green Valley Municipal Golf	Sioux City, IA	6:00 a.m.	86	--	96
June 25th	Covington Links Golf	S. Sioux City, NE	11:15 a.m.	85	--	88
June 25th	Elmwood Golf Course	Sioux Falls, SD	5:30 p.m.	87	--	89
June 27th	Powder Horn Golf Club	Sheridan, WY	6:30 a.m.	86	94	89
June 27th	The Briarwood	Billings, MT	12:30 p.m.	88	89	93
June 28th	Anchorage Golf Course	Anchorage, AK	4:30 a.m.	91	--	89
June 29th	Kona Country Club	Kailua Kona, HI	10:00 a.m.	86	--	93
		Average		86.34		93.26
		Std.Dev		2.95		3.99

CASE : The 50 State Golf Marathon (cont.)

- Of the two finishers, Jack and Arlie, who is the better golfer? Support your answer using a confidence interval or a hypothesis test.