KAAP 602

Statistics

Practice ANOVA Problems

Instructions: For each of the problems below, decide which form of ANOVA to apply, then perform the analysis in SPSS and interpret the results.

Problem 1: A researcher theorizes that a torn supraspinatus tendon will result in different compensations to scapulothoracic (ST) movements when compared to those of individuals with tears in both the infraspinatus and supraspinatus tendons. He designs an experiment that categorizes individuals into one of two groups based on MRI readings: single tear, or double tear. He then measures ST contribution (measured in percent) to humerothoracic (HT) motion by measuring ST orientation at 3 HT positions: 30 deg abduction, 60 deg abduction, and 90 deg abduction. Using the data below, determine whether individuals with double tears utilize their scapula differently from individuals with single tears.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **30 Degrees** | **60 Degrees** | **90 Degrees** |
| Single Tear | 52. 44.  47. 48.  44. 45.  51. 45.  43. 50. | 41. 45.  42. 43.  43. 47.  43. 46.  45. 44. | 40. 39.  41. 42.  41. 38.  43. 44.  43. 45. |
| Double Tear | 43. 45.  44. 43.  42. 41.  42. 47.  45. 44. | 48. 47  49. 50  47. 48  46. 47  49. 49 | 50. 52  53. 55  54. 53  52. 50  51. 56 |

Problem 2: Rowers plant their feet on a platform referred to as a footstretcher, and this platform is always placed at the same height and angle in the shell. A researcher wishes to determine whether there is a more optimal position/orientation for the footstretcher based on the fact that every joint has an optimal range of force generation. He tests the capacity of 10 rowers to generate a maximum amount of impulse in a 5-second period at 3 different footstretcher angles (traditional, +20 degrees, - 20 degrees), and at 3 different footstretcher heights (traditional, +10 cm, -10cm). Impulse is measured in N.s. Using the data below, conduct the appropriate analysis and interpret the results.

|  |  | |  | |  | |
| --- | --- | --- | --- | --- | --- | --- |
|  | **+20 Degrees** | | **Traditional** | | **-20 Degrees** | |
| +20 cm | |  | | --- | | 2000 | | 2050 | | 2121 | | 2122 | | 2200 | | |  | | --- | | 2321 | | 2450 | | 2543 | | 2560 | | 2704 | | |  | | --- | | 2521 | | 2566 | | 2577 | | 2656 | | 2865 | | |  | | --- | | 2867 | | 2869 | | 2980 | | 2988 | | 3010 | | |  | | --- | | 2083 | | 2194 | | 2097 | | 2010 | | 2121 | | |  | | --- | | 2122 | | 2209 | | 2233 | | 2317 | | 2421 | |
| Neutral | |  | | --- | | 2337 | | 2366 | | 2434 | | 2523 | | 2567 | | |  | | --- | | 2654 | | 2658 | | 2743 | | 2755 | | 2811 | | |  | | --- | | 2989 | | 2908 | | 3010 | | 3100 | | 3133 | | |  | | --- | | 3242 | | 3277 | | 3327 | | 3437 | | 3154 | | |  | | --- | | 2121 | | 2235 | | 2315 | | 2345 | | 2424 | | |  | | --- | | 2434 | | 2553 | | 2554 | | 2568 | | 2766 | |
| -20 cm | |  | | --- | | 2055 | | 1921 | | 1987 | | 1990 | | 1993 | | |  | | --- | | 2109 | | 2020 | | 2034 | | 2121 | | 2131 | | |  | | --- | | 2428 | | 2544 | | 2549 | | 2568 | | 2656 | | |  | | --- | | 2657 | | 2657 | | 2767 | | 2778 | | 2876 | | |  | | --- | | 1983 | | 1990 | | 1990 | | 2022 | | 2050 | | |  | | --- | | 2100 | | 2109 | | 2314 | | 2318 | | 2506 | |

Problem 3: Skepticism over the concept that online education and face-to-face education are equally effective prompted one researcher to test this theory. She divided her class into two groups based on their scores from their first exam: students who scored above average, and students who scored below average. She then assigned each group to one of three different approaches: 1) online only, 2) face-to-face only, and both online and face-to-face. At the end of the section, she administered an exam. The exam scores are below. Conduct the appropriate analysis and interpret the results.

|  |  | |  | |  | |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Online** | | **Face to Face** | | **Both** | |
| Above Average | 85  86  97  91  85 | 92  89  85  82  88 | 90  93  95  91  89 | 94  94  90  89  88 | 93  92  93  89  89 | 95  97  92  90  89 |
| Below Average | 83  79  80  78  81 | 74  74  75  78  73 | 80  82  82  86  81 | 79  80  77  78  82 | 81  83  85  84  82 | 80  86  79  81  84 |