



TECH SKILLS

End of Semester Prac Exam Notes



Did you get a normal or good night's sleep? Have you eaten any large meals in the last 3 hours? Have you done any strenuous exercise in the last 24 hours?

Contents

Class II Skills	3
Blood Analysis	3
Skin Folds (Sum of 6), Body Density, and Body Fat %	5
Females	5
YMCA	7
Bruce	9
Resting ECG	12
Check pages 403-405 Data Analysis	15
Class III Skills.....	20
Treadmill Speed and Grade	20
Resting Blood Pressure, Heart Rate, and CVD Risk Scores	21
Exercising CV Measures	23
BMI and WHR	24
Sum of 3 and Body Fat and Body Density Calculation	25
Grip strength	26
Multistage sit-up test	27
1RM Bench Press	28
3RM Leg Press	29
Vertical Jump and Reach Test	30
Standing Long Jump	31
Push Up	32
Curl Up	33
Beighton	35
Sit and Reach	36
Modified Sit and Reach	37
Weight Bearing Lunge Test	38
Queen’s College Step Test	39
Wingate	41
20m Sprint	43
505 Agility	47
Repeat Sprint Ability (RSA)	50
Short Physical Performance Battery (SPPB)	52
Stair Climb Power Test	56
Timed Up and Go	57
Fast Walk Speed	58
Tandem Backwards Walk Test	59

Functional Forward Reach	60
Activities-Specific Balance Confidence Scale (ABC-S).....	61
Floor Rise to Stand.....	62
6-Minute Walk Test (6MWT).....	63
Long-Distance Corridor Walk (LDCW)	65
Pulmonary Function Test.....	67
Chair Sit and Reach	69

Skin Folds (Sum of 6), Body Density, and Body Fat %

(Acceptable TEM % for these measures is 7.5%)

Skinfolds measure body composition. They can give us a good indication of your body fat percentage.

Sum of Six Skinfolds – Australian Population Normative Data:

PERCENTILES	AGE (years)					
	18 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 – 78
	Females					
5	51.6	49.5	66.1	60.7	67.1	65.8
25	79.1	74.7	91.1	105.9	106.5	98.4
50	103.2	100.3	129.8	141.5	134.7	129.1
75	141.9	140.7	168.2	174.1	160.3	149.2
95	204.2	201.4	222.3	211.0	201.4	193.4

Calculating Exact Percentiles

$$= (25-5) \div (79.1-51.6) \times (\text{_____} - 51.6) + 5$$

$$= (50-25) \div (103.2-79.1) \times (\text{_____} - 79.1) + 25$$

$$= (75-50) \div (141.9-103.2) \times (\text{_____} - 103.2) + 50$$

$$= (95-75) \div (204.2-141.9) \times (\text{_____} - 141.9) + 75$$

Body Density

Females

Withers et al.—six site formula

$$\text{Body density} = 1.20953 - [0.08294 \times (\log_{10}X_1)]$$

X₁ = sum of six skinfolds (in mm): triceps, subscapular, supraspinale, abdominal, front thigh, medial calf

Participant population: cross-section of body types and levels of habitual activity

Jackson and Pollack—three site formula

$$\text{Body density} = 1.099421 - [0.0009929 \times (X_1)] + [0.0000023 \times (X_1)^2] - [0.0001392 \times (\text{age})]$$

X_1 = sum of three skinfolds (in mm): triceps, iliac crest, front thigh

Participant population: cross-section of body types and levels of habitual activity

Jackson and Pollack—four site formula

$$\text{Body density} = 1.096095 - 0.0006952 \times (X_1) + 0.0000011 \times (X_1)^2 - [0.0000714 \times (\text{age})]$$

X_1 = sum of three skinfolds (in mm): triceps, iliac crest, abdomen, front thigh

Participant population: cross-section of body types and levels of habitual activity

Body Fat %

Siri equation

$$\text{Body fat \%} = [(4.95/\text{body density}) - 4.50] \times 100$$

Percentiles	Body Fat (%)	
	Males	Females
0	2.4	8.1
20	24.0	34.1
40	27.5	38.4
50	29.0	40.2
60	30.4	41.9
80	33.6	45.8
100	52.5	63.0

Calculating Exact Percentiles (Body Fat)

$$= (20-0) \div (34.1-8.1) \times (\text{_____} - 8.1) + 0$$

$$= (40-20) \div (38.4-34.1) \times (\text{_____} - 34.1) + 20$$

$$= (50-40) \div (40.2-38.4) \times (\text{_____} - 38.4) + 40$$

$$= (60-50) \div (41.9-40.2) \times (\text{_____} - 40.2) + 50$$

$$= (80-60) \div (45.8-41.9) \times (\text{_____} - 41.9) + 60$$

$$= (100-80) \div (63.0-45.8) \times (\text{_____} - 45.8) + 80$$

F-test

27. To find the P-Value from the F-test, type “=FTEST(array1, array2)”
28. For the arrays you have to go back to the “Males” and “Females” data sheets and select the data
 - Array 1 is the male data set
 - Delete array1 and go to the male data sheet and select all the data for that variable
 - Array 2 is the female data set
 - Delete array2 and go to the female data sheet and select all the data for that variable
 - The formula should look like **=FTEST(Males!C2:C29, Females!C2:C45)**

A	B	C	FTEST(array1, array2)	F	G	H	I
44845214	Male	40	13	5.2	5	1.8	1.45
44348920	Male	43	12.9	5.4	5	1.1	1.3
Student Nu	Male	51	16.7	4.5	3	0.7	1.2
Student Nu	Male	40	17.8	5.3	4.91	3.1	1.66
44344566	Male	45	15.6	5.5			0.85
44837899	Male	45	14.5	5.5	3.5	2.3	1.5
44847366	Male	50	15	7.2	5	0.9	1.4
44396864	Male	42	14	3.1	4.9	1.2	1.4
44859266	Male	44	13.9	6.2	5.03	1.23	1.5
44353876	Male	50	13.6	5.4	5.1	2.75	1.01
44348144	Male	49	13.1	5.4	4.21	1.73	0.79
44329107	Male	48	10.2	3.8			
43913330	Male	48		5.3			
43218307	Male	45	15.8	5.4	3.01	0.73	0.82
44845102	Male	38	13	5.2	4.7	1.75	1.38
44841056	Male	43	14	4.6	5.01	1.27	1.81
44859903	Male	50	13	13.4	4.1	2.2	3.3
44806091	Male	45	15.9	5.8	4.8	1.7	1.5
43934689	Male	44	15	4	4.5	1.2	1.5
	Cout	28	27	28	25		
	Mean	45.12857	14.36815	5.112857	4.6228		

T-test

- Types of T-tests
 - Independent or unpaired – when data is from different individuals (e.g., males vs females)
 - Dependent or paired – when data is from the same individuals (e.g., data from the same group of males)
- All T-tests in the practical are two-tailed
- **If the F Test P-Value is not statistically significant (i.e., $P = >0.05$), select “2” for the type of T-test**
- **If the F Test P-Value is statistically significant (i.e., $P = <0.05$), select “3” for the type of T-test**
- 29. To find the T Test P-Value, use the formula “=TTEST(array1, array2, tails, type)”
 - Array 1 is the male data set
 - Array 2 is the female data set
 - Tails is two-tailed

- Type is 2

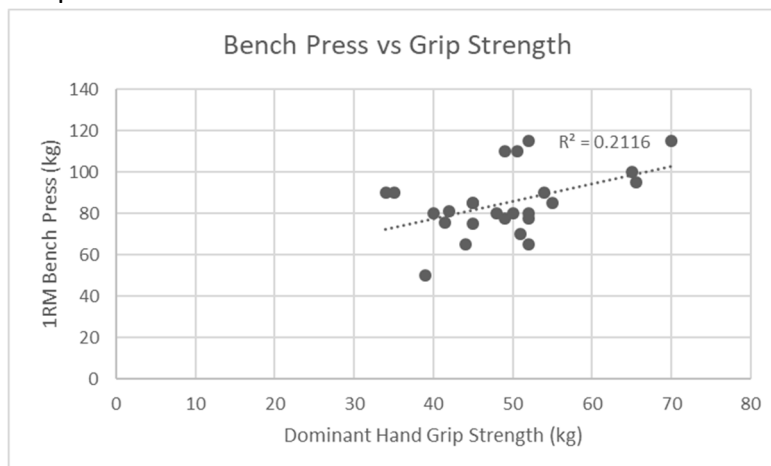
Hypothesis

30. Create a research hypothesis

- There is/is no difference in _____ between males and females enrolled in the EXMD2382 course in 2018.

Correlations

- Strength of the relationship
 - o >0.5 = Large
 - o $0.5-0.3$ = Moderate
 - o $0.3-0.1$ = Small
 - o <0.1 = Insubstantial
- 31. Select the data columns you wish to use and paste them in a new sheet called "Correlation"
- 32. Highlight both columns (but only the cells with data) and go "Insert" and select "Scatter," "Scatter with only Markers"
- 33. Right click on one of the data points and select "Add Trendline"
- 34. In the "Format Trendline" section on the side, select "Linear" and also click "Display R-squared value on chart"



- 35. To determine the strength of the relationship, take the R-squared value and square root it
 - E.g., r value = $\sqrt{0.2116} = 0.46$ = moderate positive relationship
- 36. Label chart, with title and axis titles and put units in as well

Class III Skills

Treadmill Speed and Grade

Treadmill Speed

1. Place down three masking tape markers on belt and number them 1, 2, 3
2. Measure the distance between the top end of each tape (1-2, 2-3, 3-1) and sum to get treadmill belt length
3. Remove two of the tapes, place tape on the frame of the treadmill and align
4. Set treadmill to 5 km/h, wait until speed is reached, begin stopwatch and count 30 revs
5. Repeat procedure with someone walking on the treadmill at 5 km/h
6. Calculate measures
 - a. Revs/sec \rightarrow revs/min (x 60)
 - b. Revs/min \rightarrow m/min (x belt length)
 - c. m/min \rightarrow km/h (x 0.06)

- Repeat for 10km/h and 15km/h

- Repeat all of the above with someone running on the treadmill

Treadmill Grade

1. Set treadmill to 5 km/h at 10% grade
2. Place inclinometer or spirit level parallel to belt with adjustable lever towards the back of the treadmill
 - a. If using inclinometer use the measured angle to calculate % grade
 - i. % grade = $\tan(\text{angle}) \times 100$
 - b. If using spirit level, adjust lever so bubble is in the middle. Measure vertical height from bottom of spirit level to treadmill. **This height (in cm) is the treadmill grade percentage**

% Error = [(calculated – displayed) / displayed] x 100

Speed % error = [(calculated speed – displayed speed) / displayed speed] x 100

Grade % error = [(calculated grade – displayed grade) / displayed grade] x 100

% Error must be <1% to be acceptable

Weight Bearing Lunge Test

The weight bearing lunge test assesses the dorsiflexion ROM at the ankle joint. Poor ROM may increase risk of lower limb injury

1. Shoes off
2. Face a wall with one foot (test leg) aligned in front of the other and hands placed on the wall
3. Align foot 10cm from wall to big toe, 30cm from heel of front foot to toes of back foot
4. Then bends the front knee, aiming to gently touch the knee to the wall without lifting the heel off the ground (**assessor touches heel to see if it lifts**)
5. Move the foot forward if the client can't touch the wall without their heel lifting
6. Move the foot back if the client can touch the wall with without their heel lifting
7. When the participant reaches an estimated maximal distance, start the 3 trials
8. Place a ruler next to the foot and measure the distance to the wall
9. Repeat this for the opposite foot



A result of <9-10cm is restricted

- This places the client at an increased risk of leg injuries

Queen's College Step Test

HRmax = 195

85% HRmax = 165

The Queen's College step test is a submaximal VO₂max test. It gives us an estimation of your VO₂max, which can give us a good indication of your overall cardiorespiratory fitness and risk of CVD.

1. Step needs to be 41.3cm high (or as close as possible)
2. Fit heart rate monitor
3. Stop test if HR goes above 85% HRmax

4. Record baseline HR and blood press pressure
5. Set metronome to 88 bpm
6. Ensure **whole foot** is placed on step (one step = both feet up and back down)
7. Stop test at 3 min
8. Keep stop watch going and take radial HR manually, starting at 3.05 until 3.20
9. Warm down after test

Vo₂max (mL/kg/min) = 65.81 – (0.1847 x HR during 5-20 sec recovery)

Percentile: _____ Rating: _____

HRmax = 208 – (0.7 x age)

VO2max Normative Data for Females (ml/kg/min):

AGE (yrs)						
PERCENTILE	20–29	30–39	40–49	50–59	60–69	70–79
95	55.7	51.2	49.7	43.8	39.5	36.9
90	52.9	48.7	47.2	41.7	37.6	35.0
85	51.0	47.0	45.6	40.3	36.4	33.7
80	49.5	45.7	44.2	39.2	35.4	32.7
75	48.2	44.6	43.1	38.2	34.5	31.8
70	47.0	43.6	42.0	37.4	33.8	31.0
65	46.0	42.6	41.1	36.6	33.1	30.3
60	45.0	41.7	40.1	35.8	32.4	29.6
55	44.0	40.9	39.3	35.1	31.7	29.0
50	43.0	40.0	38.4	34.4	31.1	28.3
45	42.0	39.1	37.5	33.7	30.5	27.6
40	41.0	38.3	36.7	33.0	29.8	27.0
35	40.0	37.4	35.7	32.2	29.1	26.3
30	39.0	36.4	34.8	31.4	28.4	25.6
25	37.8	35.4	33.7	30.6	27.7	24.8
20	36.5	34.3	32.6	29.6	26.8	23.9
15	35.0	33.0	31.2	28.5	25.8	22.9
10	33.1	31.3	29.6	27.1	24.6	21.6
5	30.3	28.8	27.1	25.0	22.7	19.7

- Well Above Average: (95th Percentile)**
- Above Average: (75th Percentile)**
- Average: (50th Percentile)**
- Below Average: (25th Percentile)**
- Well Below Average: (5th Percentile)**

Queen’s College Step Test Feedback:

- You just completed a fitness test which provides an estimate of your aerobic fitness or VO2max.
- Your score is _____ ml/kg/min and this places you in the ___ percentile,
- This classifies you as _____.
- I recommend you do more aerobic training to maintain this fitness component

Relative to Absolute VO2max

= VO2 ÷ 1000 x kg

Wingate

This test aims to determine the maximum amount of work that a person can perform in a period of 30 seconds

Have chair set up to the side of the bike

Have a bucket set up to the side of the bike

1. Measure body mass
2. Adjust Wattbike seat height
3. 5-minute warm up on the Wattbike pedalling at a comfortable work rate (e.g., 2-3)
4. The client takes up the starting position, seated stationary with the pedals at a 45° angle
- 5. Move the air brake gear lever to 10**
6. Keep the magnetic brake climb control on 3-4.
7. The subject is then allowed a practice start: the subject accelerates from the start position to top speed for 2-3 seconds and then rests for 60 seconds
8. From main menu select "Workout" → "Custom" → 1 0:00:30 → enter → enter
9. To start the test, say "3, 2, 1, GO"
- 10. Tell the client when they reach 10 seconds, 20 seconds, and count down the last 5 seconds (26, 27, 28, 29, 30; DO NOT SAY STOP)**
11. GIVE VERBAL ENCOURAGEMENT
12. For recovery the subject pedals comfortably in the seated position for 2-3 minutes
13. Record energy (kJ) and peak power (W)
 - Energy is the 30 second Lactic Anaerobic Work Capacity
 - To find the Lactic Anaerobic Work Capacity Index, multiply Lactic Anaerobic Work Capacity (kJ) by 1000 and divide by the body mass and record the score as J/kg

Activities-Specific Balance Confidence Scale (ABC-S)

The ABC-S test assesses balance confidence

Respondents provide ratings on a 0–10 continuous scale based on the questions

“How confident are you that you will not lose your balance or become unsteady when you [list of items]”

For each of the following activities, please indicate your level of self-confidence by choosing a corresponding number from the scale of 1 (Not at all confident) to 10 (Completely confident)

To calculate the Total rating, add up all of the scores and divide by 15 (do not include Q.16 – walking on icy footpaths)

ABC-S	Level of physical functioning
8.1 or higher	High
5. 8	Moderate
<5	Low

Floor Rise to Stand

The floor rise to stand test assesses dynamic balance and leg strength

1. Place an exercise mat on the floor
2. If the participant needs a walking aid for this test they can use it
3. Help the client lay down if needed
4. Get them laying down
 - On their back
 - With legs and feet together
 - Arms by their side
 - Palms facing down
5. Tell them to stand up as quickly as safely possible after I say "3, 2, 1, GO"
6. Say 3, 2, 1, GO
7. **3 trials with 30 seconds rest**

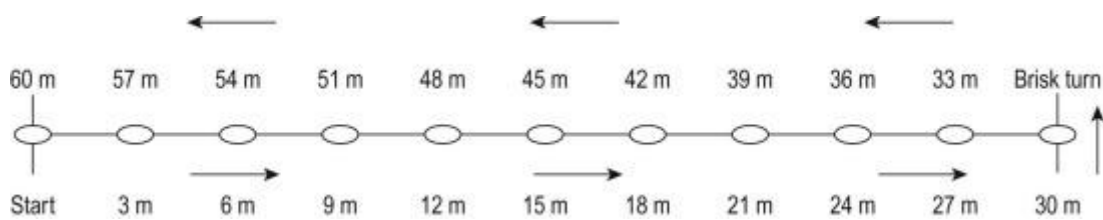


Females floor rise to standing

	60-69 Years (s)	70-80 Years (s)
Very poor	>5.06	>5.12
Poor	4.33–5.06	4.52–5.12
Average	3.78–4.32	4.07–4.51
Good	3.05–3.77	3.80–4.06
Excellent	<3.05	<3.80

6-Minute Walk Test (6MWT)

The 6-minute walk test assesses how far you can walk in 6-minutes



1. Measure 30m place marking time at the start and finish
2. Then place cones in a straight line every 3m
3. Put a heart rate monitor on the participant
4. Take a baseline blood pressure and heart rate
5. Place to heart rate watch on the client
6. Place chairs off to the side at the 0m, 15m, 30m marks
7. Have the participant sitting in the chair at the start line for 10 minutes before the test
8. Demonstrate one lap, including the turn around the cones
9. Cross off every lap that the client completes (one complete lap is up and down once [i.e., 60m])
10. When the 6 minutes is finished, tell the client to stop and mark their position with masking tape (**place an arrow in the direction they are moving**)
11. Get their heart rate at the end of the test
12. **1-minute warm down walking around the course**
13. Record the distance they have walked in the 6 minutes

- *The objective of this test is to walk as far as possible for 6 minutes*
- *You will walk back and forth in this space*
- *Six minutes is a long time to walk, so you will be exerting yourself*
- *You will probably get out of breath or become exhausted*
- *You are permitted to slow down, to stop, and to rest as necessary*
- *You may lean against the chair while resting, but resume walking as soon as you are able*
- *You will be walking back and forth around the furthest cones*
- *You should pivot briskly around the cones and continue back the other way without hesitation*