

Q. 3

Rank	Score	Outcome
1	-20.2	D
2	-5.5	D
3	-4.9	D
4	-4.1	S
5	-3.8	D
6	-3.5	S
7	-3.2	S
8	-2.8	S
9	-2.2	S
10	-1.0	D
11	2.0	S
12	2.1	D
13	2.2	S
14	2.3	D
15	3.2	D
16	4.1	S
17	4.7	S
18	5.1	S
19	6.1	S
20	17.2	S

12 - S
8 - D

$$U_A = 1(5) + 4(4) + 1(3) + 1(2) = 26$$

(b) A = group of 12 survivors, sum of ranks $T_A = 4 + 6 + 7 + 8 + 9 + 11 + 13 + 16 + 17 + 18 + 19 + 20 = 148$

(c) $T_{A(max)} = \frac{20 \times 21}{2} - \frac{8 \times 9}{2} = 210 - 36 = 174$

(d) $U_A = T_{A(max)} - T_A = 174 - 148 = 26$

$T_B = 1 + 2 + 3 + 5 + 10 + 12 + 14 + 15 = 62$

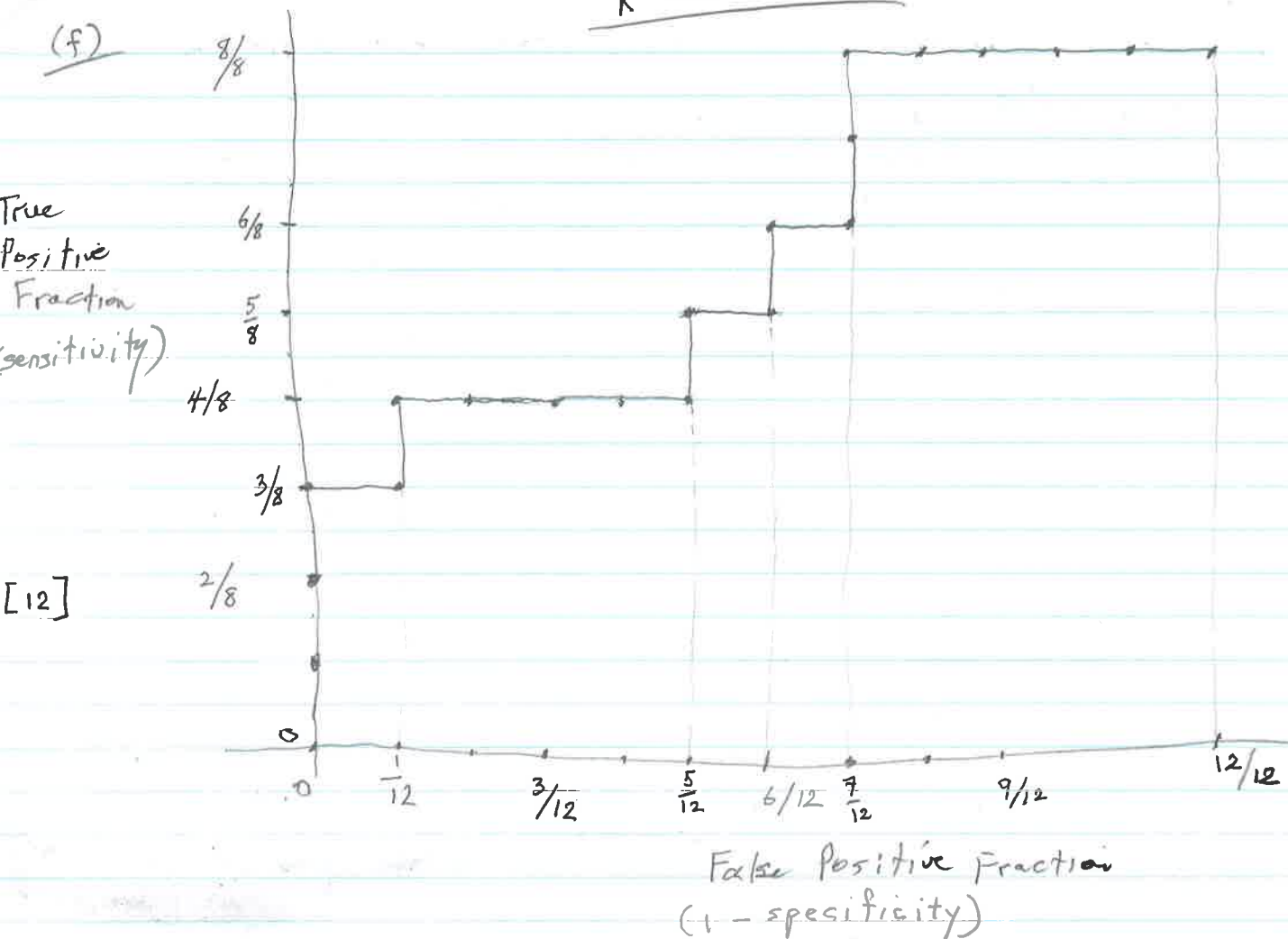
$T_{B(max)} = \frac{20 \times 21}{2} - \frac{12 \times 13}{2} = 210 - 78 = 132$

$U_B = T_{B(max)} - T_B = 132 - 62 = 70$ n.b. $U_A + U_B = 26 + 70 = 96 = 8 \times 12$

(e) Since U_A (observed) = 26, results are significant on a directional test at 0.05 level, but NOT on a non-directional test. A directional test can be used since it's expected that the more negative the score, the more likely is the outcome to be D.

(e) Cont'd Hence D outcomes should rank closer to the top of the ranking.

ROC curve



(g) Area under ROC curve (AUC):

$$\frac{3}{8} \left(\frac{1}{12} \right) + \frac{4}{8} \left(\frac{4}{12} \right) + \frac{5}{8} \left(\frac{1}{12} \right) + \frac{6}{8} \left(\frac{1}{12} \right) + \frac{8}{8} \left(\frac{5}{12} \right)$$

$$= \frac{3 + 16 + 5 + 6 + 40}{96} = \frac{70}{96} = \frac{35}{48} = 0.7291\bar{6}$$