1 Numerical Result

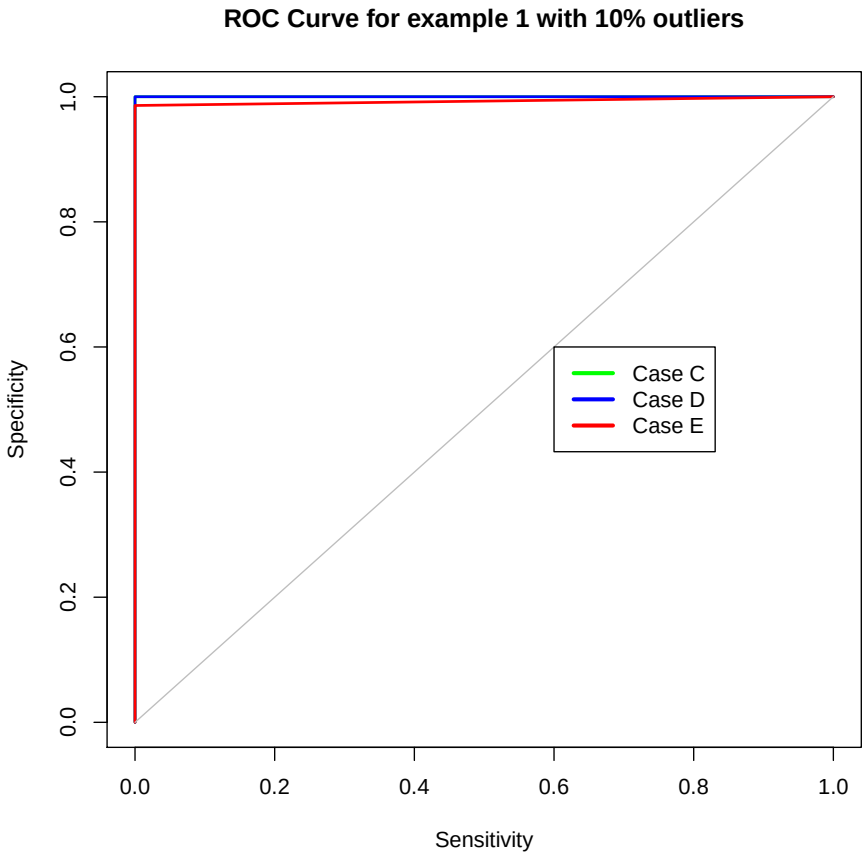


Table 1: Variable Selection Results for Example 1 ($\beta = (3, 2, 1.5, 0, 0, 0, 0, 0)'$ with 10% outliers)

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
		Case A				**Case B**		
ALasso	74	23	3.29	0.8	63	25	3.25	0.78
sLTS	9	89	6.19	358.85	14	86	5.92	357.24
MMNNG	68	25	3.25	691.33	88	12	3.13	682.07
SROS	21	76	4.31	56.67	31	69	4.24	51.79
SROS-2	46	53	3.66	13.49	67	33	3.38	13.09
ASROS-2	71	24	3.24	13.66	87	13	3.14	13.81
PAWLS	38	56	3.68	16.41	64	36	3.42	19.32
APAWLS	61	28	3.27	20.04	89	11	3.11	20.18
		Case C				**Case D**		
ALasso	3	2	1.94	0.73	0	19	2.52	0.99
sLTS	28	72	5.34	384.69	21	79	5.71	398.44
MMNNG	72	12	2.95	673.93	63	16	3.25	682.47
SROS	41	50	3.7	50.24	8	80	4.76	50.31
SROS-2	45	53	3.76	13.44	61	32	3.91	15.04
ASROS-2	78	17	3.18	14.06	70	17	3.42	15.74
PAWLS	52	44	3.64	21.1	98	0	2.98	22.83
APAWLS	74	20	3.19	21.78	97	0	2.97	23.66
		Case E						
ALasso	5	10	2.72	0.72				
sLTS	23	77	5.7	383.1				
MMNNG	73	10	3.04	675.46				
SROS	26	61	4.45	50.08				
SROS-2	29	40	3.91	13.78				
ASROS-2	48	14	3.26	14.51				
PAWLS	55	39	3.48	21.01				
APAWLS	79	15	3.16	22.5				

Table 2: Variable Selection and outliers detection Results for Example 1 ($\beta = (3, 2, 1.5, 0, 0, 0, 0, 0)'$ with 10% outliers)

		Variable Selection					Outliers detection					
Case	Method	CFR	OFR	AN	FP	FN	M	S	JD	FP	FN	TIME
A	ALasso	74	23	3.29	99	7.5	-	-	-	-	-	0.8
	MMNNG	68	25	3.25	97	8.2	-	-	-	-	-	691.33
	SROS	21	76	4.31	99	27.6	-	-	-	-	-	56.67
	SROS-2	46	53	3.66	99.7	15.4	0	0.02	1	NaN	0.01	13.49
	ASROS-2	71	24	3.24	98.3	7.3	0	0.02	1	NaN	0.01	13.66
	sLTS	9	89	6.19	99.3	46.4	0	0.11	1	NaN	0	358.85
	PAWLS	38	56	3.68	98	17.3	0	0.08	1	NaN	0	16.41
	APAWLS	61	28	3.27	96.3	9.4	0	0.05	1	NaN	0	20.04
B	ALasso	63	25	3.25	95.7	8.9	-	-	-	-	-	0.78
	MMNNG	88	12	3.13	100	3.2	-	-	-	-	-	682.07
	SROS	31	69	4.24	100	24.6	-	-	-	-	-	51.79
	SROS-2	67	33	3.38	100	9	0	0.15	1	NaN	0.05	13.09
	ASROS-2	87	13	3.14	100	3.4	0	0.07	1	NaN	0.03	13.81
	sLTS	14	86	5.92	100	43.1	0	0.15	1	NaN	0	357.24
	PAWLS	64	36	3.42	100	9.9	0	0.1	1	NaN	0	19.32
	APAWLS	89	11	3.11	100	2.8	0	0.06	1	NaN	0	20.18
C	ALasso	3	2	1.94	50	NaN	-	-	-	-	-	0.73
	MMNNG	72	12	2.95	94	3.2	-	-	-	-	-	673.93
	SROS	41	50	3.7	97	17.5	-	-	-	-	-	50.24
	SROS-2	45	53	3.76	99.3	16.9	0	0.12	1	0.51	0.04	13.44
	ASROS-2	78	17	3.18	98.3	5.5	0	0	1	0.51	0	14.06
	sLTS	28	72	5.34	100	34.7	0	0.04	1	0	0	384.69
	PAWLS	52	44	3.64	98.7	14.5	0	0.07	1	0	0	21.1
	APAWLS	74	20	3.19	98	5.7	0	0	1	0	0	21.78
D	ALasso	0	19	2.52	60.3	NaN	-	-	-	-	-	0.99
	MMNNG	63	16	3.25	92	10.7	-	-	-	-	-	682.47
	SROS	8	80	4.76	96	37.1	-	-	-	-	-	50.31
	SROS-2	61	32	3.91	97.7	17.2	0.16	0.14	0.76	0.42	0.04	15.04
	ASROS-2	70	17	3.42	95.3	11.7	0.2	0	0.74	0.41	0	15.74
	sLTS	21	79	5.71	100	39.5	0.08	0.06	0.8	0	0	398.44
	PAWLS	98	0	2.98	99.3	0	0	0.06	1	0	0	22.83
	APAWLS	97	0	2.97	99	0	0	0	1	0	0	23.66
E	ALasso	5	10	2.72	58	NaN	-	-	-	-	-	0.72
	MMNNG	73	10	3.04	94	5.2	-	-	-	-	-	675.46
	SROS	26	61	4.45	95.7	30.2	-	-	-	-	-	50.08
	SROS-2	29	40	3.91	89.3	25.7	0.09	0.15	0.86	0.45	0.05	13.78
	ASROS-2	48	14	3.26	86.7	14	0.14	0	0.78	0.43	0	14.51
	sLTS	23	77	5.7	100	39.2	0.03	0.05	0.94	0	0	383.1
	PAWLS	55	39	3.48	98	12.4	0.01	0.06	0.99	0	0	21.01
	APAWLS	79	15	3.16	98	5.2	0.01	0	0.98	0	0	22.5

Table 3: Variable Selection Results for Example 1 ($\beta = (3, 2, 1.5, 0, 0, 0, 0, 0)'$ with 20% outliers)

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
		Case C				**Case D**		
ALasso	1	2	1.22	0.7	1	4	1.68	1.19
sLTS	25	75	5.18	426.53	17	82	6.1	440.39
MMNNG	65	5	2.76	470.24	31	33	3.96	473.42
SROS	47	45	3.62	50.14	3	75	5.15	50.54
SROS-2	36	52	3.64	13.65	57	33	3.69	15.83
ASROS-2	65	20	3.1	14.01	64	23	3.46	16.6
PAWLS	47	49	3.65	21.51	95	0	2.97	24.83
APAWLS	78	12	3.02	22.14	92	0	2.94	25.29
		Case E						
ALasso	3	3	1.29	0.79				
sLTS	27	73	5.16	417.6				
MMNNG	54	3	3.06	688.65				
SROS	23	49	4.64	51.28				
SROS-2	21	43	3.95	14.33				
ASROS-2	41	11	3.17	15.35				
PAWLS	53	42	3.52	21.57				
APAWLS	64	10	2.86	23.87				

Table 4: Variable Selection and outliers detection Results for Example 1 ($\beta = (3, 2, 1.5, 0, 0, 0, 0, 0)'$ with 20% outliers)

		Variable Selection						Outliers detection				
Case	Method	CFR	OFR	AN	FP	FN	M	S	JD	FP	FN	TIM
A	ALasso	74	23	3.29	99	7.5	-	-	-	-	-	
	MMNNG	68	25	3.25	97	8.2	-	-	-	-	-	691
	SROS	21	76	4.31	99	27.6	-	-	-	-	-	56
	SROS-2	46	53	3.66	99.7	15.4	0	0.02	1	NaN	0.01	13
	ASROS-2	71	24	3.24	98.3	7.3	0	0.02	1	NaN	0.01	13
	sLTS	9	89	6.19	99.3	46.4	0	0.11	1	NaN	0	358
	PAWLS	38	56	3.68	98	17.3	0	0.08	1	NaN	0	16
	APAWLS	61	28	3.27	96.3	9.4	0	0.05	1	NaN	0	20
B	ALasso	63	25	3.25	95.7	8.9	-	-	-	-	-	0
	MMNNG	88	12	3.13	100	3.2	-	-	-	-	-	682
	SROS	31	69	4.24	100	24.6	-	-	-	-	-	51
	SROS-2	67	33	3.38	100	9	0	0.15	1	NaN	0.05	13
	ASROS-2	87	13	3.14	100	3.4	0	0.07	1	NaN	0.03	13
	sLTS	14	86	5.92	100	43.1	0	0.15	1	NaN	0	357
	PAWLS	64	36	3.42	100	9.9	0	0.1	1	NaN	0	19
	APAWLS	89	11	3.11	100	2.8	0	0.06	1	NaN	0	20
C	ALasso	1	2	1.22	31	NaN	-	-	-	-	-	
	MMNNG	65	5	2.76	90	1.6	-	-	-	-	-	470
	SROS	47	45	3.62	97.3	15.5	-	-	-	-	-	50
	SROS-2	36	52	3.64	95.7	18	0	0.21	1	0.51	0.06	13
	ASROS-2	65	20	3.1	94.7	6.4	0	0	1	0.51	5×10^{-4}	14
	sLTS	25	75	5.18	100	34.4	0	0.01	1	0	0	426
	PAWLS	47	49	3.65	98.3	15.7	0	0.09	1	0	0	21
	APAWLS	78	12	3.02	96.3	3.3	0	2.5×10^{-4}	1	0	0	22
D	ALasso	1	4	1.68	41.7	NaN	-	-	-	-	-	1
	MMNNG	31	33	3.96	87.7	27.2	-	-	-	-	-	473
	SROS	3	75	5.15	92.7	44.3	-	-	-	-	-	50
	SROS-2	57	33	3.69	96.7	15.3	0.1	0.2	0.77	0.44	0.06	15
	ASROS-2	64	23	3.46	95.7	12.1	0.2	0	0.7	0.4	2.5×10^{-4}	1
	sLTS	17	82	6.1	99.7	44	0.25	0.05	0.45	0	0	440
	PAWLS	95	0	2.97	98.3	0.5	0.01	0.07	0.99	0	0	24
	APAWLS	92	0	2.94	97.3	0.5	0.01	0	0.99	0	0	25
E	ALasso	3	3	1.29	32.3	NaN	-	-	-	-	-	0
	MMNNG	54	3	3.06	83.7	12.3	-	-	-	-	-	688
	SROS	23	49	4.64	90.3	35	-	-	-	-	-	51
	SROS-2	21	43	3.95	87.3	27.9	0.06	0.2	0.84	0.47	0.06	14
	ASROS-2	41	11	3.17	82.3	15.9	0.14	0	0.72	0.43	2.5×10^{-4}	15
	sLTS	27	73	5.16	100	33.6	0.07	0.02	0.84	0	0	41
	PAWLS	53	42	3.52	98.3	13.2	0	0.07	1	0	0	21
	APAWLS	64	10	2.86	90	4	0.06	0	0.82	0	0	23

Table 5: Variable Selection Results for Example 1 ($\beta = (3, 2, 1.5, 0, 0, 0, 0, 0)'$ with 30% outliers)

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
		Case C				**Case D**		
ALasso	2	0	0.68	0.78	0	3	0.96	1.34
sLTS	1	34	4.52	421.79	0	95	6.84	459.78
MMNNG	38	1	2.3	465.41	5	41	4.29	477.06
SROS	49	38	3.5	51.07	1	76	5.17	53.23
SROS-2	29	54	3.91	13.54	53	36	3.95	16.29
ASROS-2	61	17	3.06	14.41	51	31	3.61	17.14
PAWLS	45	47	3.5	21.54	93	0	2.93	26.08
APAWLS	77	10	2.98	22.41	89	0	2.89	26.66
		Case E						
ALasso	0	3	1.15	0.79				
sLTS	0	76	7.1	428.75				
MMNNG	6	21	3.97	704.12				
SROS	9	44	5.1	52.25				
SROS-2	9	37	4.32	14.81				
SROS-2	14	10	3.48	15.38				
PAWLS	54	21	3.06	21.85				
PAWLS	52	4	2.57	24.28				

Table 6: Variable Selection and outliers detection Results for Example 1 ($\beta = (3, 2, 1.5, 0, 0, 0, 0, 0)'$ with 30% outliers)

		Variable Selection					Outliers detection				
Case	Method	CFR	OFR	AN	FP	FN	M	S	JD	FP	
A	ALasso	74	23	3.29	99	7.5	-	-	-	-	
	MMNNG	68	25	3.25	97	8.2	-	-	-	-	
	SROS	21	76	4.31	99	27.6	-	-	-	-	
	SROS-2	46	53	3.66	99.7	15.4	0	0.02	1	NaN	0
	ASROS-2	71	24	3.24	98.3	7.3	0	0.02	1	NaN	0
	sLTS	9	89	6.19	99.3	46.4	0	0.11	1	NaN	
	PAWLS	38	56	3.68	98	17.3	0	0.08	1	NaN	
	APAWLS	61	28	3.27	96.3	9.4	0	0.05	1	NaN	
B	ALasso	63	25	3.25	95.7	8.9	-	-	-	-	
	MMNNG	88	12	3.13	100	3.2	-	-	-	-	
	SROS	31	69	4.24	100	24.6	-	-	-	-	
	SROS-2	67	33	3.38	100	9	0	0.15	1	NaN	0
	ASROS-2	87	13	3.14	100	3.4	0	0.07	1	NaN	0
	sLTS	14	86	5.92	100	43.1	0	0.15	1	NaN	
	PAWLS	64	36	3.42	100	9.9	0	0.1	1	NaN	
	APAWLS	89	11	3.11	100	2.8	0	0.06	1	NaN	
C	ALasso	2	0	0.68	19	NaN	-	-	-	-	
	MMNNG	38	1	2.3	75.3	NaN	-	-	-	-	
	SROS	49	38	3.5	95.7	13.7	-	-	-	-	
	SROS-2	29	54	3.91	94.3	22.8	0	0.2	1	0.51	0
	ASROS-2	61	17	3.06	92.3	7.3	6.67×10^{-4}	2.86×10^{-4}	0.99	0.51	2.86×1
	sLTS	1	34	4.52	72.7	NaN	0.21	0	0	0	
	PAWLS	45	47	3.5	97.3	13.9	0	0.08	1	0	
	APAWLS	77	10	2.98	95.7	2.8	0	0	1	0	
D	ALasso	0	3	0.96	25.7	NaN	-	-	-	-	
	MMNNG	5	41	4.29	79.3	42.5	-	-	-	-	
	SROS	1	76	5.17	92.3	45.7	-	-	-	-	
	SROS-2	53	36	3.95	96.3	18.6	0.11	0.17	0.67	0.44	0
	ASROS-2	51	31	3.61	93.7	16	0.23	0	0.62	0.39	
	sLTS	0	95	6.84	98.3	56.2	0.46	0.04	0	0	
	PAWLS	93	0	2.93	97.7	0	0	0.08	1	0	
	APAWLS	89	0	2.89	96.3	0	0	0	1	0	
E	ALasso	0	3	1.15	25.3	NaN	-	-	-	-	
	MMNNG	6	21	3.97	70.7	38.1	-	-	-	-	
	SROS	9	44	5.1	82.3	47.7	-	-	-	-	
	SROS-2	9	37	4.32	78.3	40	0.1	0.18	0.64	0.45	0
	ASROS-2	14	10	3.48	68.7	31	0.27	0	0.42	0.38	5.71×1
	sLTS	0	76	7.1	91.7	60.5	0.45	0.03	0	0	
	PAWLS	54	21	3.06	91	8.2	0.01	0.07	0.97	0	
	APAWLS	52	4	2.57	83.3	2	0.08	0	0.77	0	

Table 7: Variable Selection Results for Example 2 ($\beta = (\mathbf{2}'_{10}, \mathbf{0}'_{p-10})'$ with 10% outliers

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
		Case A				**Case B**		
ALasso	97	0	9.96	3.4	84	1	9.75	3.41
sLTS	0	84	61.38	3.16×10^4	0	93	58.23	3.03×10^4
SROS-2	6	94	14.54	301.31	8	92	14.19	302.06
ASROS-2	96	1	9.97	339.64	97	0	9.97	338.11
PAWLS	6	94	15.65	348.92	5	95	14.29	356.33
APAWLS	94	1	9.89	399.08	91	0	9.5	421.68
		Case C				**Case D**		
ALasso	0	0	6.25	4.07	0	1	6.89	4.07
sLTS	0	95	62.58	3.11×10^4	0	96	62.73	3.09×10^4
SROS-2	1	98	18.9	383.85	1	98	18.75	387.58
ASROS-2	60	1	9.54	425.27	56	3	9.59	429.07
PAWLS	3	96	16.12	525.96	3	96	16.19	492.91
APAWLS	85	0	9.84	575.21	85	0	9.84	541.23
		Case E						
ALasso	0	0	12.18	4.06				
sLTS	0	97	62.63	3.11×10^4				
SROS-2	2	97	18.34	382.04				
ASROS-2	57	1	9.45	422.2				
PAWLS	4	96	16.35	524.59				
APAWLS	88	0	9.88	569.03				

Table 8: Variable Selection and outliers detection Results for Example 2 ($\beta = (\mathbf{2}'_{10}, \mathbf{0}'_{p-10})'$ with 10% outliers)

		Variable Selection					Outliers detection					
Case	Method	CFR	OFR	AN	FP	FN	M	S	JD	FP	FN	TIME
A	ALasso	97	0	9.96	99.6	0	-	-	-	-	-	3.4
	SROS-2	6	94	14.54	100	27.1	0	0	1	NaN	0	301.31
	ASROS-2	96	1	9.97	99.6	0.1	0	0	1	NaN	0	339.64
	sLTS	0	84	61.38	97.9	84	0	0.25	1	NaN	0	3.16×10^4
	PAWLS	6	94	15.65	100	30.5	0	0.01	1	NaN	0	348.92
	APAWLS	94	1	9.89	98.8	0.1	0	0.01	1	NaN	0	399.08
B	ALasso	84	1	9.75	97.1	0.4	-	-	-	-	-	3.41
	SROS-2	8	92	14.19	100	26.5	0	0.07	1	NaN	0.03	302.06
	ASROS-2	97	0	9.97	99.7	0	0	0.05	1	NaN	0.03	338.11
	sLTS	0	93	58.23	99.2	82.8	0	0.25	1	NaN	0	3.03×10^4
	PAWLS	5	95	14.29	100	27.2	0	0.03	1	NaN	0	356.33
	APAWLS	91	0	9.5	95	0	0	0.06	1	NaN	0	421.68
C	ALasso	0	0	6.25	54.5	10	-	-	-	-	-	4.07
	SROS-2	1	98	18.9	99.9	42.3	0	0.14	1	0.51	0.04	383.85
	ASROS-2	60	1	9.54	95.1	0.3	0	0.02	1	0.51	0.01	425.27
	sLTS	0	95	62.58	99.1	84.1	0	0.17	0.99	0	0	3.11×10^4
	PAWLS	3	96	16.12	99.9	34.1	0	0.01	1	0	0	525.96
	APAWLS	85	0	9.84	98.3	0.1	0	0.01	1	0	0	575.21
D	ALasso	0	1	6.89	56.3	13.6	-	-	-	-	-	4.07
	SROS-2	1	98	18.75	99.9	42.1	0.04	0.15	0.92	0.48	0.05	387.58
	ASROS-2	56	3	9.59	94.6	1.2	0.06	0.02	0.92	0.47	0.01	429.07
	sLTS	0	96	62.73	99.4	84.1	0	0.16	0.98	0	0	3.09×10^4
	PAWLS	3	96	16.19	99.9	34.3	0	0.01	1	0	0	492.91
	APAWLS	85	0	9.84	98.3	0.1	0	0.01	1	0	0	541.23
E	ALasso	0	0	12.18	62	45.4	-	-	-	-	-	4.06
	SROS-2	2	97	18.34	99.9	41.4	0	0.14	1	0.51	0.04	382.04
	ASROS-2	57	1	9.45	94.2	0.3	0	0.02	1	0.51	0.01	422.2
	sLTS	0	97	62.63	99.2	84.1	0	0.17	0.99	0	0	3.11×10^4
	PAWLS	4	96	16.35	100	33.8	0	0.01	1	0	0	524.59
	APAWLS	88	0	9.88	98.8	0	0	0	1	0	0	569.03

Table 9: Variable Selection Results for Example 2 ($\beta = (\mathbf{2}'_{10}, \mathbf{0}'_{p-10})'$ with 20% outliers

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
		Case C				**Case D**		
ALasso	0	0	5.7	6.45	0	0	6.15	6.89
sLTS	0	69	65.89	3.17×10^4	0	96	63.61	3.15×10^4
SROS-2	0	82	21.38	441.69	0	82	22.1	449.96
ASROS-2	22	0	8.15	483.7	22	3	8.38	480.19
PAWLS	1	98	16.67	633.1	1	98	17.23	588.62
APAWLS	79	0	9.6	670.79	82	0	9.73	624.28
		Case E						
ALasso	0	0	17.41	6.3				
sLTS	0	68	66.41	3.18×10^4				
SROS-2	0	79	21.43	439.69				
ASROS-2	20	0	8.01	473.42				
PAWLS	0	99	16.89	629.49				
APAWLS	78	0	9.62	665.07				

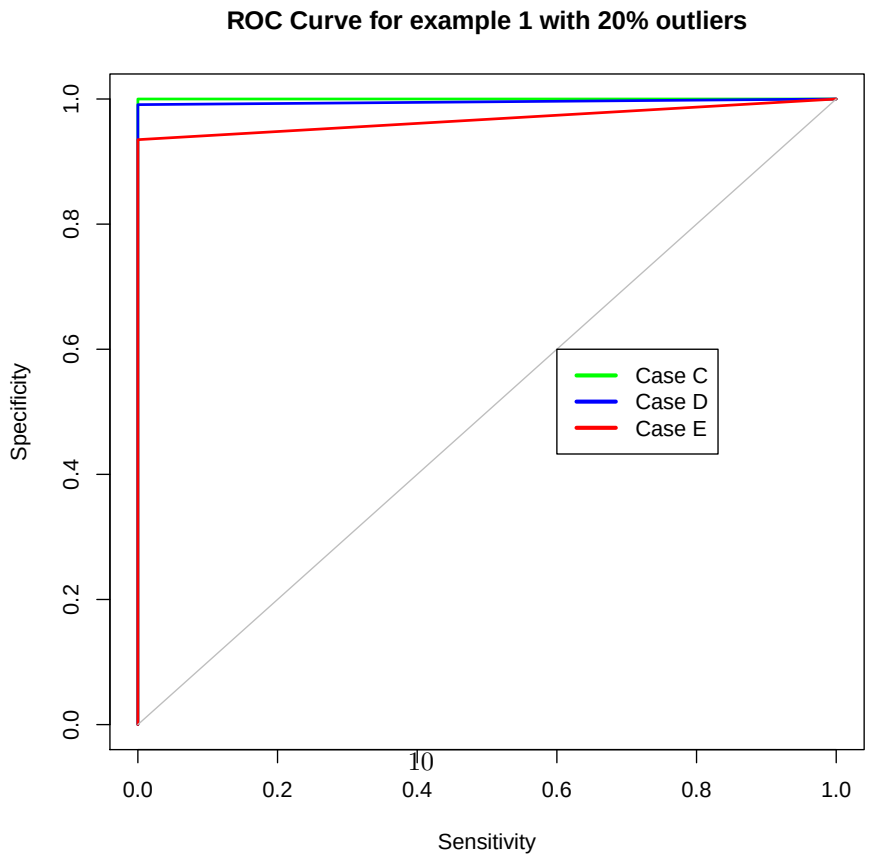


Table 10: Variable Selection and outliers detection Results for Example 2 ($\beta = (\mathbf{2}'_{10}, \mathbf{0}'_{p-10})'$ with 20% outliers)

		Variable Selection					Outliers detection					
Case	Method	CFR	OFR	AN	FP	FN	M	S	JD	FP	FN	TIME
A	ALasso	97	0	9.96	99.6	0	-	-	-	-	-	3.4
	SROS-2	6	94	14.54	100	27.1	0	0	1	NaN	0	301.31
	ASROS-2	96	1	9.97	99.6	0.1	0	0	1	NaN	0	339.64
	sLTS	0	84	61.38	97.9	84	0	0.25	1	NaN	0	3.16×10^4
	PAWLS	6	94	15.65	100	30.5	0	0.01	1	NaN	0	348.92
	APAWLS	94	1	9.89	98.8	0.1	0	0.01	1	NaN	0	399.08
B	ALasso	84	1	9.75	97.1	0.4	-	-	-	-	-	3.41
	SROS-2	8	92	14.19	100	26.5	0	0.07	1	NaN	0.03	302.06
	ASROS-2	97	0	9.97	99.7	0	0	0.05	1	NaN	0.03	338.11
	sLTS	0	93	58.23	99.2	82.8	0	0.25	1	NaN	0	3.03×10^4
	PAWLS	5	95	14.29	100	27.2	0	0.03	1	NaN	0	356.33
	APAWLS	91	0	9.5	95	0	0	0.06	1	NaN	0	421.68
C	ALasso	0	0	5.7	37.3	NaN	-	-	-	-	-	6.45
	SROS-2	0	82	21.38	97.5	51.2	5×10^{-4}	0.26	0.99	0.49	0.08	441.69
	ASROS-2	22	0	8.15	80.6	1.4	5×10^{-4}	0.06	0.99	0.49	0.03	483.7
	sLTS	0	69	65.89	92.4	85.9	0.06	0.08	0.56	0	0	3.17×10^4
	PAWLS	1	98	16.67	99.1	37.1	0	0.01	0.99	0	0	633.1
	APAWLS	79	0	9.6	95.6	1	0	0.01	0.99	0	0	670.79
D	ALasso	0	0	6.15	38	NaN	-	-	-	-	-	6.89
	SROS-2	0	82	22.1	97.7	52.3	0.03	0.25	0.89	0.48	0.08	449.96
	ASROS-2	22	3	8.38	81.9	2.1	0.05	0.05	0.89	0.47	0.03	480.19
	sLTS	0	96	63.61	99.6	84.3	0.02	0.06	0.88	0	0	3.15×10^4
	PAWLS	1	98	17.23	99.2	38.5	0.02	0.01	0.97	0	0	588.62
	APAWLS	82	0	9.73	96	1.3	0.01	0.01	0.98	0	0	624.28
E	ALasso	0	0	17.41	54.9	66.9	-	-	-	-	-	6.3
	SROS-2	0	79	21.43	96.9	52	0	0.26	0.99	0.49	0.09	439.69
	ASROS-2	20	0	8.01	79.1	1.4	0	0.07	0.98	0.49	0.03	473.42
	sLTS	0	68	66.41	93.6	85.8	0.06	0.08	0.49	0	0	3.18×10^4
	PAWLS	0	99	16.89	99.1	38.1	0	0.01	0.99	0	0	629.49
	APAWLS	78	0	9.62	95.8	0.8	0	0.01	0.99	0	0	665.07

Table 11: Variable Selection Results for Example 2 ($\beta = (\mathbf{2}'_{10}, \mathbf{0}'_{p-10})'$ with 30% outliers

Method	CFR (%)	OFR (%)	AN	TIME	CFR (%)	OFR (%)	AN	TIME
	Case C				**Case D**			
ALasso	0	0	6.26	7.26	0	0	7.03	7.28
sLTS	0	0	70.39	3.21×10^4	0	79	65	3.19×10^4
SROS-2	0	29	26.66	479.79	0	30	26.62	485.56
ASROS-2	3	1	7.17	508.84	3	1	7.44	516.55
PAWLS	5	80	17.36	703.58	3	88	17.81	661.14
APAWLS	40	0	8.94	737.98	40	3	8.94	695.01
	Case E							
ALasso	0	0	17.89	6.67				
sLTS	0	0	70.03	3.22×10^4				
SROS-2	0	31	27.87	486.7				
ASROS-2	3	0	6.9	516.53				
PAWLS	3	81	17.36	715.17				
APAWLS	38	0	8.76	748.69				

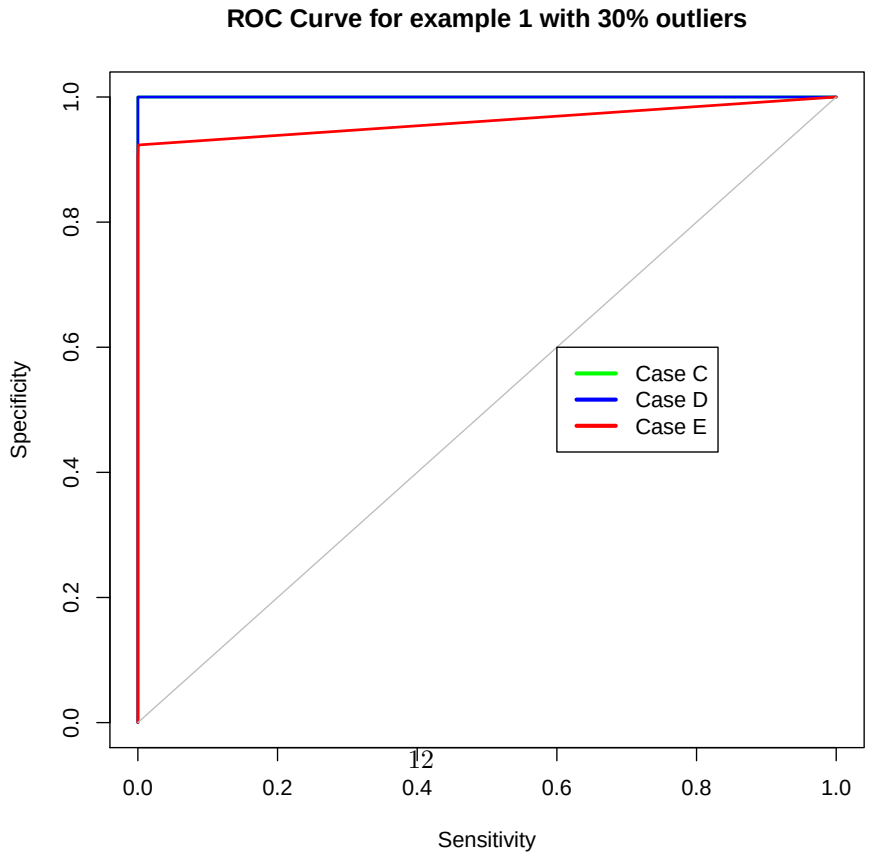


Table 12: Variable Selection and outliers detection Results for Example 2 ($\beta = (\mathbf{2}'_{10}, \mathbf{0}'_{p-10})'$ with 30% outliers)

		Variable Selection					Outliers detection					
Case	Method	CFR	OFR	AN	FP	FN	M	S	JD	FP	FN	TIME
A	ALasso	97	0	9.96	99.6	0	-	-	-	-	-	3.4
	SROS-2	6	94	14.54	100	27.1	0	0	1	NaN	0	301.31
	ASROS-2	96	1	9.97	99.6	0.1	0	0	1	NaN	0	339.64
	sLTS	0	84	61.38	97.9	84	0	0.25	1	NaN	0	3.16×10^4
	PAWLS	6	94	15.65	100	30.5	0	0.01	1	NaN	0	348.92
	APAWLS	94	1	9.89	98.8	0.1	0	0.01	1	NaN	0	399.08
B	ALasso	84	1	9.75	97.1	0.4	-	-	-	-	-	3.41
	SROS-2	8	92	14.19	100	26.5	0	0.07	1	NaN	0.03	302.06
	ASROS-2	97	0	9.97	99.7	0	0	0.05	1	NaN	0.03	338.11
	sLTS	0	93	58.23	99.2	82.8	0	0.25	1	NaN	0	3.03×10^4
	PAWLS	5	95	14.29	100	27.2	0	0.03	1	NaN	0	356.33
	APAWLS	91	0	9.5	95	0	0	0.06	1	NaN	0	421.68
C	ALasso	0	0	6.26	24.1	NaN	-	-	-	-	-	7.26
	SROS-2	0	29	26.66	84.9	63.6	0.01	0.23	0.8	0.48	0.09	479.79
	ASROS-2	3	1	7.17	61.4	11.5	0.02	0.1	0.79	0.48	0.05	508.84
	sLTS	0	0	70.39	58.8	91.6	0.26	0.04	0	0	0	3.21×10^4
	PAWLS	5	80	17.36	91.3	41.7	0.02	0.02	0.87	0	0	703.58
	APAWLS	40	0	8.94	82.1	8.3	0.02	0.02	0.87	0	0	737.98
D	ALasso	0	0	7.03	25.2	NaN	-	-	-	-	-	7.28
	SROS-2	0	30	26.62	85.3	63.9	0.03	0.23	0.71	0.47	0.09	485.56
	ASROS-2	3	1	7.44	63	12.6	0.06	0.09	0.71	0.47	0.05	516.55
	sLTS	0	79	65	97.3	85	0.33	0.07	0	0	0	3.19×10^4
	PAWLS	3	88	17.81	96.2	41.2	0.08	0.01	0.82	0	0	661.14
	APAWLS	40	3	8.94	86.5	4.1	0.05	0.01	0.86	0	0	695.01
E	ALasso	0	0	17.89	46.3	NaN	-	-	-	-	-	6.67
	SROS-2	0	31	27.87	82.7	65.3	0.02	0.23	0.75	0.48	0.09	486.7
	ASROS-2	3	0	6.9	58.4	12.5	0.03	0.1	0.72	0.48	0.05	516.53
	sLTS	0	0	70.03	63.3	90.9	0.28	0.05	0	0	0	3.22×10^4
	PAWLS	3	81	17.36	91.1	41.8	0.03	0.03	0.85	0	0	715.17
	APAWLS	38	0	8.76	80.6	8.8	0.03	0.03	0.85	0	0	748.69

Table 13: Outlier Detection Evaluation in Example 1 and 2 with 10% outliers

		sLTS			PAWLS		
	Model	M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case A	0	0.11	1	0	0.05	1
	Case B	0	0.15	1	0	0.06	1
	Case C	0	0.04	1	0	0	1
	Case D	0.08	0.06	0.8	0	2.22×10^{-4}	1
	Case E	0.03	0.05	0.94	0.01	4.44×10^{-4}	0.98
Example 2	Case A	0	0.25	1	0	0.01	1
	Case B	0	0.25	1	0	0.06	1
	Case C	0	0.17	0.99	0	0.01	1
	Case D	0	0.16	0.98	0	0.01	1
	Case E	0	0.17	0.99	0	0	1

Table 14: Outlier Detection Evaluation in Example 1 and 2 with 10% outliers

		sLTS			ASROS-2		
	Model	M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case A	0	0.11	1	0	0.02	1
	Case B	0	0.15	1	0	0.07	1
	Case C	0	0.04	1	0	0	1
	Case D	0.08	0.06	0.8	0.2	4.44×10^{-4}	0.74
	Case E	0.03	0.05	0.94	0.14	0	0.78
Example 2	Case A	0	0.25	1	0	0	1
	Case B	0	0.25	1	0	0.05	1
	Case C	0	0.17	0.99	0	0.02	1
	Case D	0	0.16	0.98	0.06	0.02	0.92
	Case E	0	0.17	0.99	0	0.02	1

Table 15: Outlier Detection Evaluation in Example 1 and 2 with 20% outliers

		sLTS			PAWLS		
	Model	M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case C	0	0.01	1	0	2.5×10^{-4}	1
	Case D	0.25	0.05	0.45	0.01	2.5×10^{-4}	0.99
	Case E	0.07	0.02	0.84	0.06	0	0.82
Example 2	Case C	0.06	0.08	0.56	0	0.01	0.99
	Case D	0.02	0.06	0.88	0.01	0.01	0.98
	Case E	0.06	0.08	0.49	0	0.01	0.99

Table 16: Outlier Detection Evaluation in Example 1 and 2 with 20% outliers

		sLTS			ASROS-2		
	Model	M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case C	0	0.01	1	0	0	1
	Case D	0.25	0.05	0.45	0.2	2.5×10^{-4}	0.7
	Case E	0.07	0.02	0.84	0.14	2.5×10^{-4}	0.72
Example 2	Case C	0.06	0.08	0.56	5×10^{-4}	0.06	0.99
	Case D	0.02	0.06	0.88	0.05	0.05	0.89
	Case E	0.06	0.08	0.49	0	0.07	0.98

Table 17: Outlier Detection Evaluation in Example 1 and 2 with 30% outliers

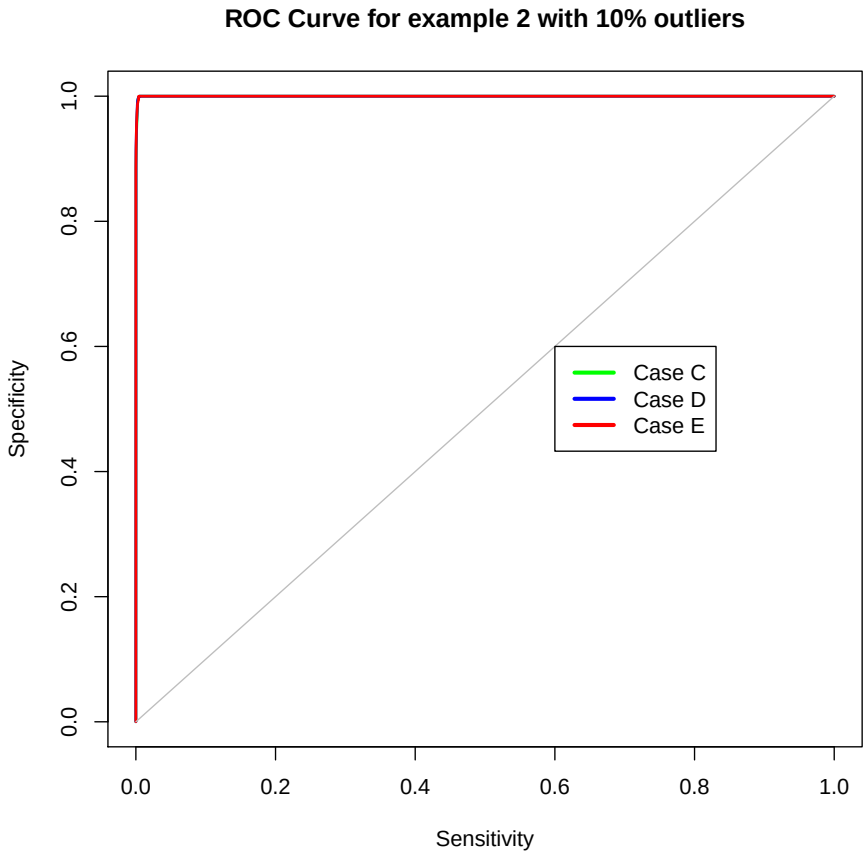
		sLTS			PAWLS		
	Model	M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case C	0.21	0	0	0	0	1
	Case D	0.46	0.04	0	0	0	1
	Case E	0.45	0.03	0	0.08	8.57×10^{-4}	0.77
Example 2	Case C	0.26	0.04	0	0.02	0.02	0.87
	Case D	0.33	0.07	0	0.05	0.01	0.86
	Case E	0.28	0.05	0	0.03	0.03	0.85

Table 18: Outlier Detection Evaluation in Example 1 and 2 with 30% outliers

		sLTS			ASROS-2		
	Model	M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case C	0.21	0	0	6.67×10^{-4}	2.86×10^{-4}	0.99
	Case D	0.46	0.04	0	0.23	0	0.62
	Case E	0.45	0.03	0	0.27	0	0.42
Example 2	Case C	0.26	0.04	0	0.02	0.1	0.79
	Case D	0.33	0.07	0	0.06	0.09	0.71
	Case E	0.28	0.05	0	0.03	0.1	0.72

Table 19: Outlier Detection Evaluation in Example 1

		IPOD			PAWLS		
	Model	M (%)	S (%)	JD(%)	M (%)	S (%)	JD(%)
Example 1	Case A	0	0	1	0	0.05	1
	Case B	0	0.1	1	0	0.06	1
	Case C	0	0.08	1	0	0	1
	Case D	0.49	0.02	0.07	0	2.22×10^{-4}	1
	Case E	0.22	0.05	0.31	0.01	4.44×10^{-4}	0.98


ROC Curve for example 2 with 10% outliers
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Sensitivity
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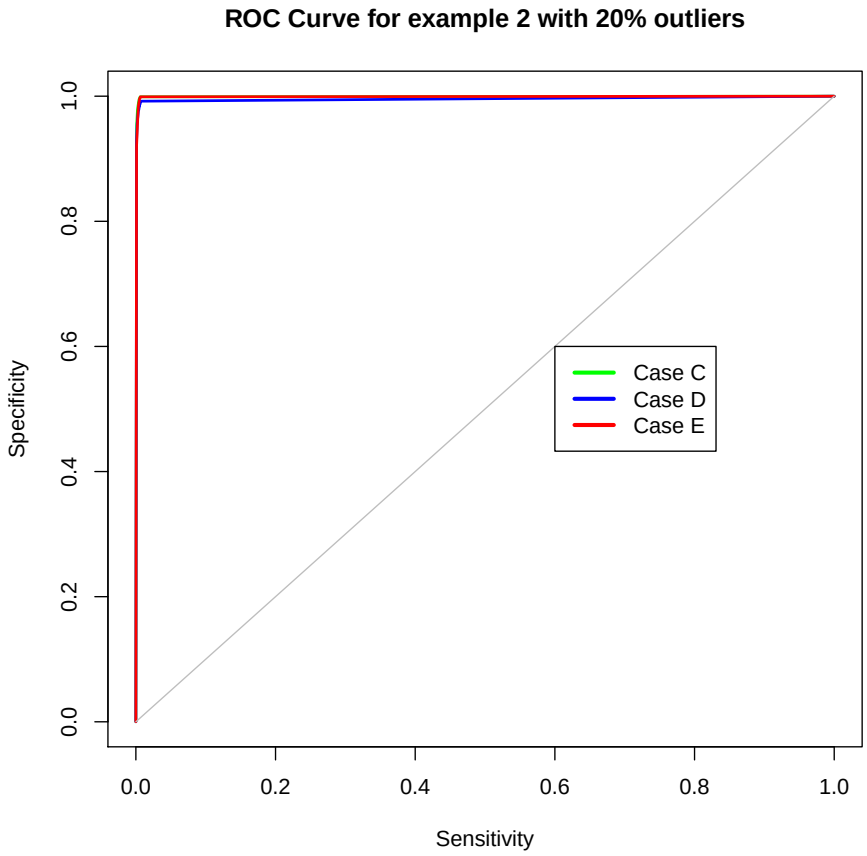
0.2
0.4
0.6
0.8
1.0
Case C
Case D
Case E


ROC Curve for example 2 with 20% outliers
Specificity
Sensitivity
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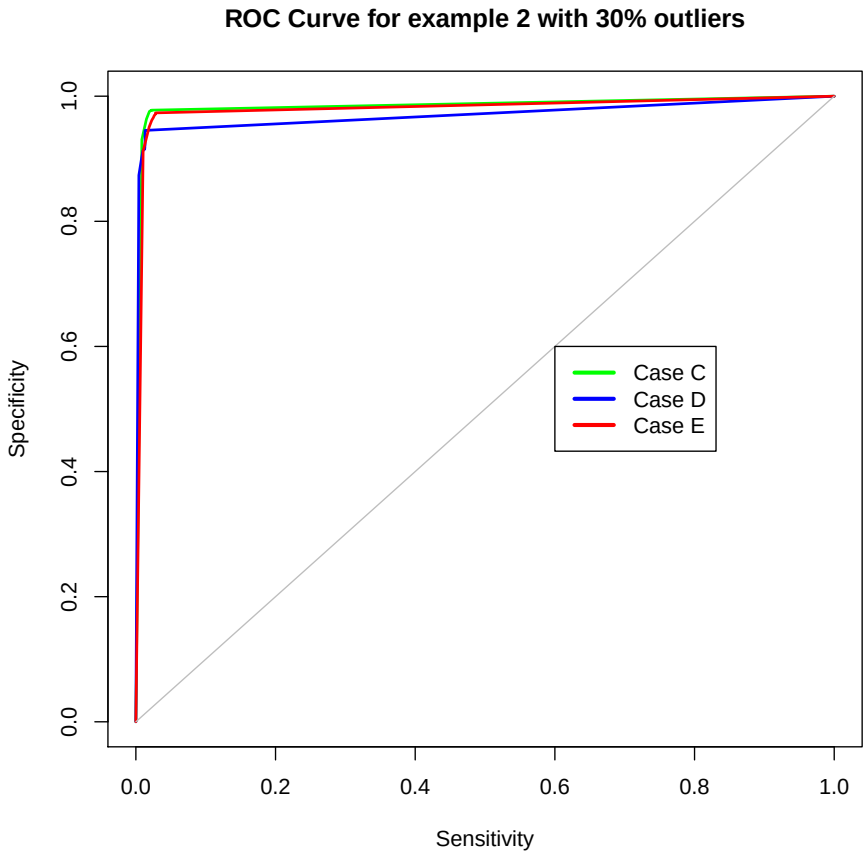
0.2
0.4
0.6
0.8
1.0
Case C
Case D
Case E


ROC Curve for example 2 with 30% outliers
Specificity
Sensitivity
0.0
0.2
0.4
0.6
0.8
1.0
Case C
Case D
Case E