* Graded: 2.1, 5.1, 5.2

2.1

Model A: p(x) = 1/4

* p(x=1) = ¼
* p(x=2) = ¼
* p(x=3) = ¼
* p(x=4) = ¼

Sum(p(x=1:4)) = 1

There is no bias in this model, because each face of the die correctly has equal chance of landing face down.

Model B: p(x) = x/10

* p(x=1) = 1/10 = .1
* p(x=2) = 2/10 = .2
* p(x=3) = 3/10 = .3
* p(x=4) = 4/10 = .4

Sum(p(x=1:4)) = 1

This model is biased towards larger values of x, which should not be more likely to land facedown smaller values.

Model C: p(x) = 12/(25x)

* p(x=1) = 12/25 = .48
* p(x=2) = 12/50 = .24
* p(x=3) = 12/75 = .16
* p(x=4) = 12/100 = .12

Sum(p(x=1:4)) = 1

This model is biased towards smaller values of x, which should not be more likely to land facedown larger values.

5.1

False alarm rate: .05

Hit rate: .99

First prior: .001

First test:

P(T=+|ϴ = ☹)p(ϴ=☹)/(p(T=+| ϴ)p(ϴ)

.99 \* .001 / (.99 \*.001 +.05 \* ( 1-.001) = .019417

Second test:

New prior: .019

(1-.99 \* .019) / ((1-.99 \*.019) +((1-.05) \* ( 1-.019)) = .000209

5.2

A.

5.2

|  |  |  |  |
| --- | --- | --- | --- |
|  | ϴ = ☹ | ϴ = ☺ |  |
| D=+ | .99\*.001\*100,00=99 | .05\*(1.0-.001)\*100,000 = 4,995 | 5,094 |
| D=- | (1-.99)\*.001&100,00=1 | (1-.05)\*(1.0-.001)\*100,00 = 94.905 | 94,906 |
|  | .001\*100,00=100 | (1.0-.001)\*100,00=99,900 | 100,00 |

B.

100 out of 5k is about 2%, I actually thought it would be an even smaller percentage

Calculating exactly is 99/5,09=.0194

C.

|  |  |
| --- | --- |
| Left | Right |
| 10,000\*.99=9,900 | 9,990,000\*.05 = 499,500 |
| 9,900\*(1.0-.99)=99 | 499,500\*(1.0-.05)=474,525 |