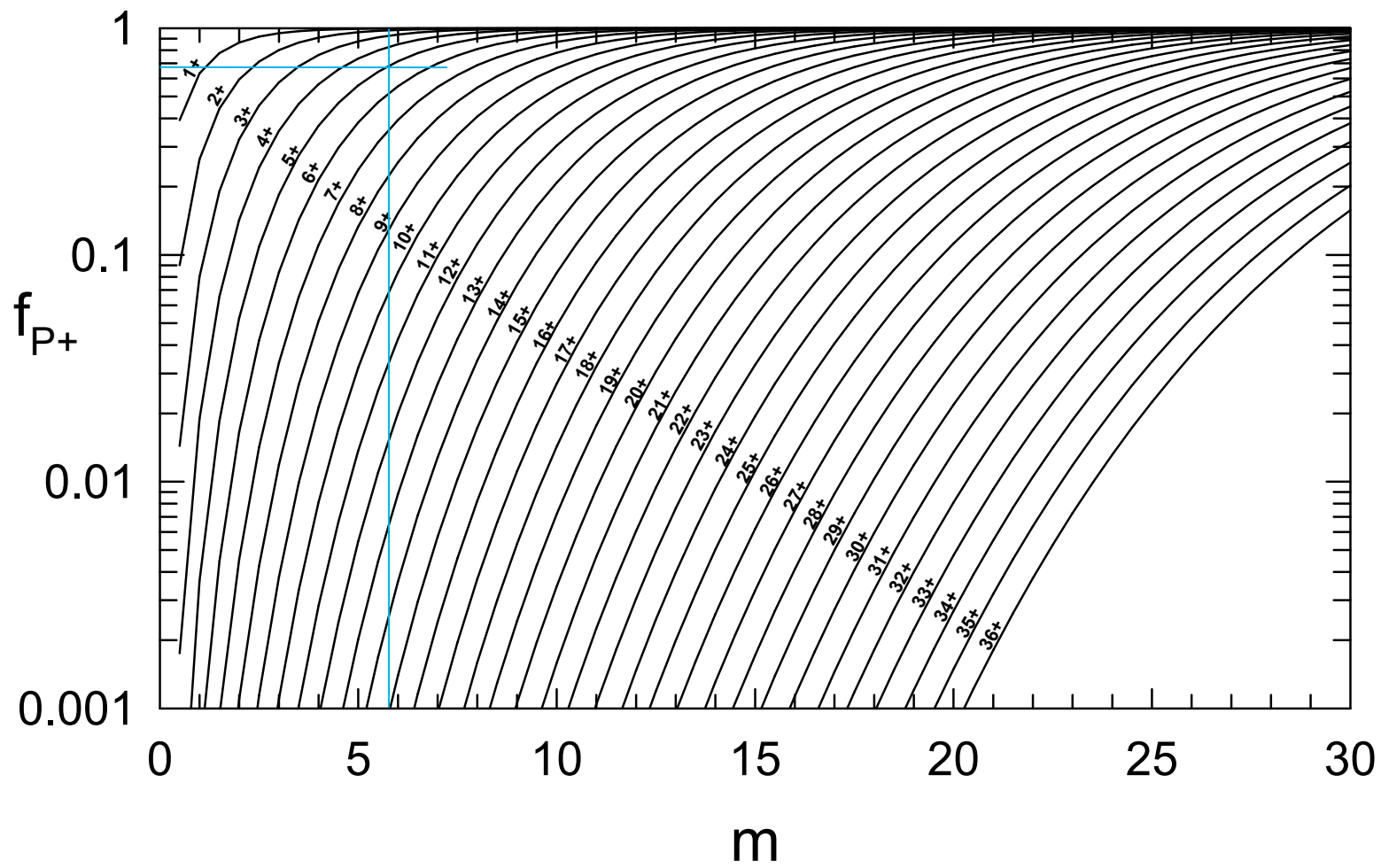
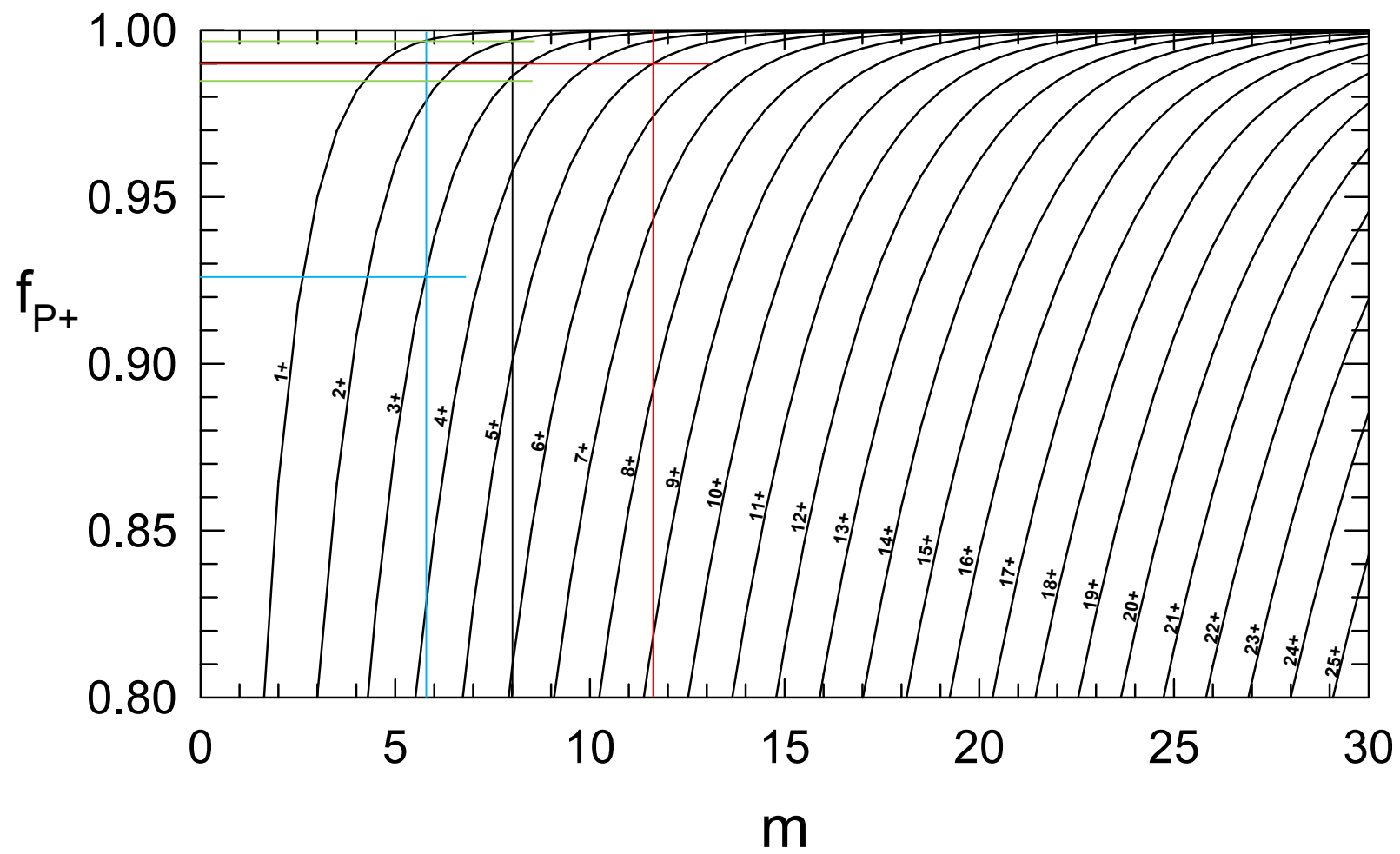






ENGR4520
C.3 Solution

$$V_0 = 1500 \text{ L}$$
$$C = 50 \text{ L/min}$$

a) $f_{P+} = 99\%$
 $P+ = 5+$

from 80% - 100% chart, we find $m = 11.6$

$$\text{so time} = 1500 \text{ L} / (50 \text{ L/min}) \times (11.6) = \underline{348 \text{ min}} \text{ (in red)}$$

b) if 50% of the time calculated in part i) is used, then $m = 5.8$.

find f_{5+} for $m = 5.8$

from 0.1% - 100% chart, we find the intersection of $P+ = 5+$ and $m = 5.8$: 67% (in blue)

c) Find f_{3+} for $m = 5.8$

From 80% - 100% chart, we find the intersection of $P+ = 3+$ and $m = 5.8$: 92-93% (in blue)

d) time = 240 min, so $m = 240 \text{ min} \times 50 \text{ L/min} / 1500 \text{ L} = 8$ effective passes

i) From 80% - 100% chart, we find the intersection of $m = 8$ and $f_{P+} = 99\%$: 2.8 (in black)
Of course, no part of the solution passed 2.8 times, so a better answer would be “98.5% of the solution passed 3 or more times, and 99.7% of the solution passed 2 or more times” (in green).

ii) From 80% - 100% chart, we find the intersection of $m = 8$ and $P+ = 5+$: a little less than 90% (in brown)