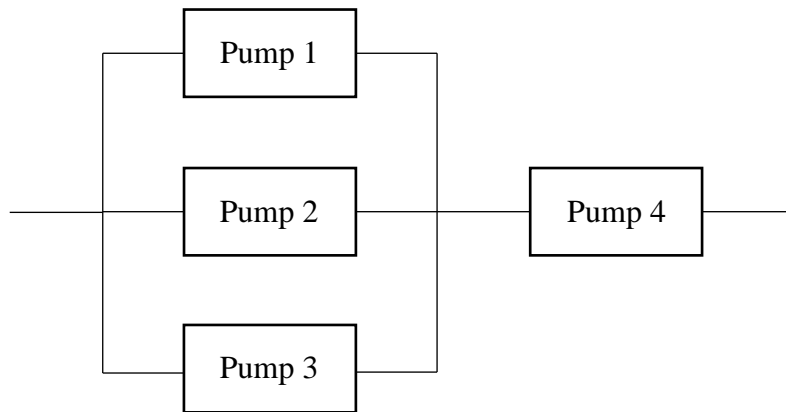


A pumping system on an oil field consists of four pumps as shown below. The reliabilities of the individual pumps are $R_1 = 0.95$, $R_2 = 0.92$, $R_3 = 0.86$, and $R_4 = 0.96$, and the states of the pumps are independent. (1) Calculate the reliability and the probability of failure of the system. (2) Assume that the cost of improving reliability of each pump is the same. If a higher system reliability is desired and the reliability of only one pump can be improved due to the cost concern, which pump should be improved in terms of reliability?



Solution

$$R = 0.9595$$

Pump 4 needs to be improved.