2. Note that the last gauge height given is higher than any of the stages used in constructing the rating curve. What potential problems do you see with this estimate?

Part C: Probability

1. Construct a Flood Frequency Curve for Holly Creek (data in Table 3) by following these steps:
   a) Rank the peak annual discharges for 1970-2002 from highest (1) to lowest (33) on Tab.5.
   b) Using the following formulas, calculate P and RI for each year. Write your results in Table 5.

   Where:

   P = probability of occurrence a flood greater than or equal to the size listed in any single year

   m = the rank of each discharge in the sample

   n = the sample size (total number of years in this case)

$$P = \frac{m}{n+1}$$

There are several formulas for calculating this probability value, or plotting position as it is frequently known when plotted on special probability paper. Here, we have used the Weibull formula, because of its ease of use for illustration purposes. The US Geological Survey, among others, also uses this formula in their plotting–position diagrams. Since the return period, R I, is estimated by taking the inverse of the probability, we can estimate the return period of each annual peak flow using an inverse of the Weibull formula.

Probability (P) is related to recurrence interval (RI) by the following formula:

RI = 1/P

Where: **P is expressed in decimal <u>not</u> percentage form**

EXAMPLE:

If the probability of a certain discharge is .05 (or 5%)
RI = 1/0.05 = 20 years.

2. Using the USGS arithmetic extreme-value (Gumbel) paper plot the **recurrence intervals (**R I**) against discharge**, and draw a best fit line through your points.

Year	Flow*
1970	1780
1971	2950
1972	6600
1973	3110
1974	3210
1975	4120
1976	6770
1977	8120
1978	2310
1979	2000
1980	1300
1981	2920

Year	Flow*
1982	2970
1983	925
1984	1330
1985	2240
1986	2500
1987	1620
1988	1780
1989	5100
1990	4740
1991	5700
1992	3880
1993	2100

Year	Flow*
1994	1910
1995	3480
1996	2430
1997	3350
1998	3150
1999	3110
2000	3070
2001	2000
2002	3190

Tab 3: Flow data for Holly Creek (1970 – 2002)