(1) **McNemar's Test** Improving control of blood-glucose levels is an important motivation for the use of insulin pumps by diabetic patients. However, certain side effects have been reported with pump therapy. The table below provides data on the occurrence of diabetic ketoacidosis (DKA) in patients before and after start of pump therapy:

	Before Pump Therapy	
After Therapy	No DKA	DKA
No DKA	128	7
DKA	19	7

(a) What is the appropriate procedure to test whether the rate of DKA is different before and after start of pump therapy? Normal or Exact?

(b) Perform the significance test in part (a), and report a p-value (if possible). Interpret the results.

(c) Suppose that our numbers instead looked like:

	Before Pump Therapy	
After Therapy	No DKA	DKA
No DKA	43	2
DKA	6	2

Perform a statistical test to determine if there is a difference in the occurrence of DKA in patients before and after the start of pump therapy.

(2) **Use of Automated Blood Pressure Machines**

Hypertension is defined as having:

Systolic BP $\geq$ 160 mm Hg

Diastolic BP $\geq$ 95 mm Hg

The hypertensive status of 20 patients was evaluated by an automated device and a trained observer. Note that this data is paired, since each person is having their blood pressure measured twice, once by the machine and once by a person.

Hypertensive status of 20 patients as judged by a computer device and a trained observer

	Hypertensive status			Hypertensive status	
Person	Computer device	Trained observer	Person	Computer device	Trained observer
1	–	–	11	+	–
2	–	–	12	+	–
3	+	–	13	–	–
4	+	+	14	+	–
5	–	–	15	–	+
6	+	–	16	+	–
7	–	–	17	+	–
8	+	+	18	–	–
9	+	+	19	–	–
10	–	–	20	–	–

Test the claim that the human and automated device differ in their ability to detect hypertension.