EPI 513-607 Mid-term exam, October 23, 1989.
SOLUTIONS:

Q1 : b Q2 : b Q3 : c Q4 : b Q5 : a Q6 : b Q7 : c Q8 : b

Q9

	mean	median
(a)	C	B
(b)	A	A
(c)	A	B

Q10 $Z_{Eleanor} = \frac{680 - 500}{100} = 1.8$, $Z_{Gerald} = \frac{27 - 18}{6} = 1.5$.

Q11 (a) yes
(b) no, *n* not fixed.
(c) no, couples not necessarily independent. Even if you ask them separately, their answers may be more similar than those of a randomly formed "couple".
(d) yes

Q12 Binomial distribution
(a) $\text{Bin}(11 \mid n = 20, \pi = .8) = 167\,960\ (.8)^{11}(.2)^9 = .0074$.
(b) $P(0) + P(1) + P(2) + \ldots + P(11) \approx .009$, yes.
(c) 1- $H_0 : \pi \geq .80$
2- $H_a : \pi < .80$

Q13 If it wasn't higher in church goers than nongoers, then the probability of getting a difference as big or bigger then observed, just from sampling fluctuations alone is < .05.

Q14 (a) narrower
(b) No, the 99% CI includes 28 000.

Q15 (a) 1 sample (paired) t-test. $H_0 : \Delta = 0$, $H_a : \Delta > 0$.
(b) $332 \pm t_{199}\ 108/\sqrt{200} = 332 \pm 2.58 \times 108/\sqrt{200} = (312.3, 351.7)$
(c) *n* is large enough so that we can invoke the Central Limit Theorem.
(d) There is no comparison group (who didn't get special offer) to take other factors, e.g., economy into account.

Q16 (a) 1 sample t-test. $H_0 : \Delta = 0$, $H_a : \Delta < 0$.
(b) $1.2 \pm 1.86 \times 2.4/3 = (-0.288, 2.688)$.

Q17 (a) "s.e." stand for standard error (of mean). $\bar{x} = 2821$, $s = \sqrt{n}\ SE = \sqrt{100} \times 44 = 440$.
(b) 2 sample t-test.
(c) No significant difference, means are only 23 calories apart.

Q18 (a) No, *n* not fixed.
(b) No, would have to have negative numbers. Also not continuous (discrete).
(c) Gaussian
(d) count = 700 $\bar{x} = 1050$,
$SD(\text{count}) = 700\ SE(\bar{x}) = 700\ SD(\text{individual})/\sqrt{700} = \sqrt{700}\ SD(\text{indiv}) = 19.84$.
$P(\text{count} > 1075) = P\left(Z > \frac{1075 - 1050}{19.84}\right) = P(Z > 1.26) = 0.1038$.