Solutions to Midterm Exam II
Part B

Q17.
n=10, sample mean $\bar{x} = 30{:}4$
$¾ = 7{:}$
95% Confidence Interval for $¹$ is $\bar{x} ¨ z^{¤}¾=\sqrt{n};$
which yields (26.06, 34.74) as the answer.
Note that for 95% confidence interval the value of $z^{¤}$ is 1.96.
Q18
a). $H_0 : ¹ = 25$ vs $H_a : ¹ > 25{:}$
b). Z-statistic$=\frac{\bar{x} ¡ ¹_0}{¾=\sqrt{n}}$ and its computed value$=\frac{30{:}4 ¡ 25}{7=\sqrt{10}} = 2{:}44$
c). P-value= P(Z>2.44)=area under the standard normal curve to the right of 2.44=0.0074.
d). For $® = 0{:}05($ this is because the level of significance is 5%), P-value is smaller than ®:
Hence, we reject $H_{0:}$

Part A: There were two versions of the exam: Please, see a copy of the exam (Part A) on this web page . The solutions below correspond to this version of the exam. The second version of the exam had same set of questions but in a different order.

Q1 (v1)
Ans: exercise and diet
Q2 (v1)
$P(X ¸ 3) = P(X = 3) + P(X = 4) = 0{:}4.$ Therefore, ans.=0.4
Q3(v1)
P(X<3)=$P(X · 2) = P(X = 1) + P(X = 2) = 0{:}6{:}$ Therfore, ans=0.6
Q4(v1)
The sampling distribution of $\overline{X}$ is normal with mean $¹$ and standard deviation, $¾=\sqrt{n}{:}$
Therefore,
$P(\overline{X} < 8) = P(Z < \frac{8 ¡ 8{:}1}{0{:}1=\sqrt{5}}) = P(Z < ¡\sqrt{5}) = 0{:}0125,$ from standard normal table.
Q5 (v1)
Ans: gets closer and closer to the population mean $¹{:}$
Q6(v1)
P(X is a 2, 11, or 12)=P(X=2)+P(X=11)+P(X=12)=(1/36)+(2/36)+(1/36)=4/36
Ans: 4/36.
Q7(v1)
P(X is atleast 7)=$P(X ¸ 7) = P(X = 7) + P(X = 8) + P(X = 9) + P(X = 10) + P(X = 11) + P(X = 12) = 21{=}36{:}$
Ans: 21/36.
Q8(v1)
The sampling distribution of $\overline{X}$ is normal with mean $35{;}000$ and standard deviation, $5000=\sqrt{4}{:}$
Therefore,

$P(\overline{X} \geq 40{,}000) = P\left(Z \geq \frac{40{,}000 - 35{,}000}{5000/\sqrt{4}}\right) = P(Z \geq 2) = 0.0228$, from standard normal table.

Ans: 0.0228.

Q9(v1)

Ans : not trustworthy- because the sample is not a random sample from the population of seniors.

Q10(v1)

Since, P-value is 0.022 for the test with two-sided alternative. For $\alpha = 0.01$; this P-value will be larger than α: Hence, we do not reject $H_0 : \mu = 1$ at 1% level of significance. This implies that a 99% confidence interval for μ will include the value 1.

Q11(v1).

Ans: B).

Q12 (v1)

Level of confidence is 99% which gives $z^* = 2.575$ (from standard normal table, as 99% critical value).

$n = \left(\frac{z^* \sigma}{m}\right)^2 = \left(\frac{2.575 * 2.4}{1}\right)^2 = 39$ (after rounding-off to the next integer)

Q13 (v1)

$\bar{x} = 65, z^* = 2.575, \sigma = 2.4$: Therfore, a 99% confidence interval for μ is $\bar{x} \pm z^* \frac{\sigma}{\sqrt{n}}$ which yields (65 ± 3.09) as the answer.

Q14(v1)

Ans: B).

Q15(v1)

P-value=$P\left(Z < \frac{9.8 - 10}{0.4/\sqrt{100}}\right) = P(Z < -5) < 0.0002$:

Ans: less than 0.0002

Q16(v1)

Ans: C).