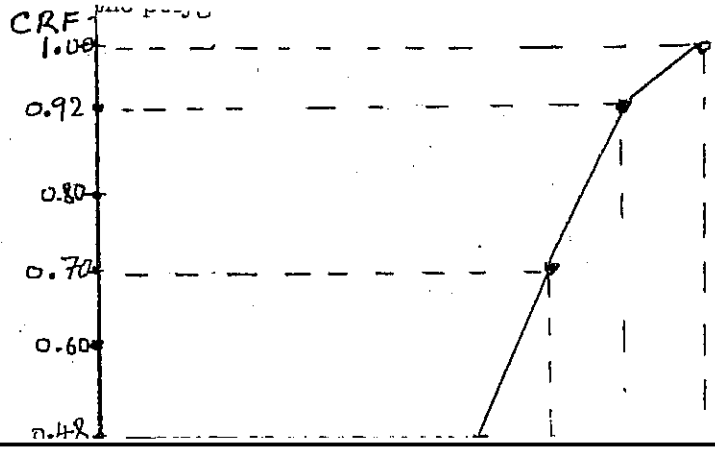
DAWSON COLLEGE

[redacted]

(1) [*2 +3 marks*] Below is the cumulative relative frequency polygon for 50 Final Exam Scores in Elementary Statistics. Estimate the mean $\overline{X}$ and the variance S^2 through the polygon.



and weights (in inches and pounds, x and y, respectively):

(3) [*2+ 2 marks*] In how many ways can 3 different Math. books, 3 different Biology books, and 5 different Psychology books be arranged on a shelf,

(a) if books of the same subject must be together?

(b) if there must be a Math. books at each end?

[redacted]

Solution

(a) $3!\left(3!\,3!\,5!\right)$

$= 25920$

(b) $P(3,2)\cdot 9! = 2177280$

(4) [*3+ 4 marks*] Consider the random variable, X, described by the number of

group of 4 students and 5 teachers.

(a) Give a function for the probability distribution of X.

(b) Find μ and σ^2.

Solution

(a) $P(X=b) = C(4, b) \cdot C(5, 3-b)$

of its upcoming games. If the coach is correct, then

(a) What is the probability that the team will win at least 14 of their next 15 games?

(b) How many games must his team play for him to expect 84 wins?

Solution

(a) $B(x; 15, 0.7)$

$p = P(x = 14) \cdot P(x = 15)$

(6) [*8 marks*] Some disease occurs in 20% of the population that lives in the south. What is the probability that 173 people went to see the doctor to get tested, that more than 40 of them has the disease?

$B(X;\ 173,\ 0.2)$

$np = 173 \times 0.2 = 34.6 \geq 5$

$nq = 173 \times 0.8 = 138.4 \geq 5$

(7) [*7 marks*] The Texas Department of Health published the state-wide results from the Emergency Medical Services Certification Examination. Those who took the paramedic exam for the first time in October 2001 got an average score of 79.68 (out of a possible 100). Suppose a random sample of 50 in-

(8) [*5 marks*] At Dawson's last registration, 16 students were timed. They averaged 50 minutes, with a standard deviation of 10, to complete their registration. Construct a 95% confidence interval estimate for the true mean time that it took students to complete their last registration at Dawson.

$$\bar{x} \pm t_{\alpha/2} \frac{s}{\sqrt{n}} = 50 \pm 2.131 \frac{10}{\sqrt{16}}$$

$$= 50 \pm 5.3286$$

$$=]44.67 , 55.33[$$

(9) [7 marks] A restaurant association says that households headed by people

under the age of 25 spend less on food away from home than households headed by people aged 25 or more. The mean amount spent by 30 households headed by people under the age of 25 is \$1526 and the population standard deviation is \$225. The mean amount spent by 40 households headed by people aged 25 or more is \$1736 and the population standard deviation is \$350. Can you support the restaurant association's claim at $\alpha = 0.01$?

$H_0 : \mu_{25-} - \mu_{25+} \geq 0$

Vs $H_a : \mu_{25-} - \mu_{25+} < 0$

Test statistic $z_0 = \dfrac{1526 - 1736}{\sqrt{\dfrac{225^2}{30} + \dfrac{350^2}{40}}} = -3.05$

(10) [*10 marks*] In a random survey of 1500 adults in California and 1000 adults in Oregon, you find that the percent who are smokers are 18.4% and 20.7%

[redacted]

proportion of adults who are smokers is lower in California than Oregon?

Solution

$x_C = n_C \hat{p}_C = 1500 \times 0.184 = 276$

Zo c/ RR

we won't reject Ho.

the [illegible] in Mream is [illegible] than the

(11) [10 marks] Consider the cholesterol values below (in mmol/l) of 7 adult males

both before and after a new lipid drug treatment regime.

distributed with a mean of 5.85 feet and a standard deviation of 0.20 feet. Does the following frequency distribution for a random sample of Canadian

$$\chi_0^2 = \sum_{i=1}^{5} \frac{(O_i - E_i)^2}{E_i} = 7.1866.$$

χ^2

$$\chi_0^2 < \chi_\alpha^2 \Rightarrow \text{the fit is}$$

good

16

(13) [*2 + 10 marks*]Consider the probability density function

$$f(x) = \begin{cases} k\cos(x) & \text{if} \quad 0 \le x \le \frac{\pi}{2} \\ 0 & \text{otherwise.} \end{cases}$$

(a) Find k

(b) Find the mean μ and the variance σ^2.

(Hint: Use integration by part.)

(a) $1 = \int_{-\infty}^{+\infty} f(x)\,dx = \int_0^{\frac{\pi}{2}} k\cos(x)\,dx$

$= k\sin(x)\Big|_0^{\frac{\pi}{2}} = k = 1$

(b) $\mu = \int_0^{\frac{\pi}{2}} x\cos x\,dx$

$= x\sin x + \cos(x)\Big|_0^{\frac{\pi}{2}}$

$= \frac{\pi}{2} - 1 \simeq 0.5708$

$\sigma^2 = \int_0^{\frac{\pi}{2}} x^2\cos(x)\,dx - \left(\frac{\pi}{2} - 1\right)^2$

$$= x^2 \sin x + 2x \cos x - 2 \sin(x) \Big|_0^{\frac{\pi}{2}} - \left(\frac{\pi}{2} - 1\right)^2$$

$$= 0.14159$$