18 pts.

ISE 2211 • Exam I • 15 May 2018 NAME SOLUTION

x3 1) There are 24 beers in a case and you're about to drink two of them. How many ways could you choose those two beers, if order doesn't matter?

Formulae:

$$P\binom{n}{r} = \frac{n!}{(n-r)!}$$

$$\binom{n}{r} = \frac{n!}{r!\,(n-r)!}$$

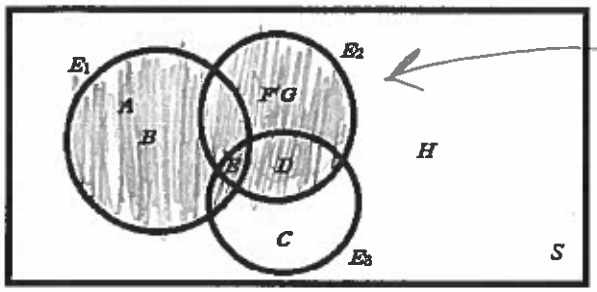
means combinations +1

$r = 2, \quad n = 24$ +1

$$\therefore \quad \binom{n}{r} = \frac{24!}{2!\,(24-2)!} = \frac{24 \times 23 \times 22!}{2!\ 22!}$$

$= 276$ ways +1

+5 2) The following Venn diagram applies to outcomes and events in the sample space *S*.



+1

Perform the following set operations. Determine the outcomes associated with each operation.

$E_1 \cap E_3$

$= \{ABE\} \cap \{EDC\} = \{E\}$ +1

$E_2 \cup E_3$

$\{EFGD\} \cup \{EDC\} = \{EFGDC\}$ +1

$E_1 \cap E_3'$

$E_3' = \{ABFGH\}$ +1

Ok if they don't explicity show this step, as long as answer is correct

$\therefore E_1 \cap E_3' = \{ABE\} \cap \{ABFGH\} = \{AB\}$

$(E_1 \cap E_3') \cup E_2$

Additionally, shade this operation on the Venn diagram.

$= \{AB\} \cup \{EFGD\} = \{ABEFGD\}$ +1

xlo 3) The following is a sample of ISE 2211 exam scores from last summer. Compute the sample mean, sample variance, sample standard deviation, and sample range. Include a unit with each answer.

Hint: $s^2 = \frac{\sum x_i^2 - \frac{(\sum x_i)^2}{n}}{n-1}$

~~8.5~~
~~18~~
~~22~~
~~18~~
~~13.5~~
~~21.5~~
~~10.5~~
~~12.5~~
~~18~~
~~11.5~~
~~21.5~~
~~10.5~~
~~18.5~~
~~21.5~~
~~15~~
~~21~~

$$\bar{X} = \frac{\sum x_i}{n} = \frac{262}{16} = 16.375 \text{ points}$$

(+2) (+1)

$$S^2 = \frac{4614.5 - \frac{262^2}{16}}{15} = 21.61\overline{6} \text{ points}^2$$

(+2) (+1)

$$S = +\sqrt{S^2} = 4.649 \text{ points}$$

(+2)

$$r = X_{max} - X_{min} = 22 - 8.5$$

$$= 13.5 \text{ points}$$

(+2)

+4 Draw a histogram that displays the frequency distribution of exam scores. Choose the number of bins and bin width appropriately. Label all axes.

# of bins: $\sqrt{16} = 4$ (+1)

bin width $= \frac{r}{\#\text{ of bins}} = \frac{13.5}{4} = 3.375$

bin 1 : up to $8.5 + 3.375 = 11.875$

bin 2 : up to $11.875 + 3.375 = 15.25$

bin 3 : 18.625

bin 4 : 22 (+1)

ordered points :

8.5
10.5
10.5
11.5 } 4
(1)
12.5
13.5 } 3
15
(2)
18
18 } 4
18.5
(3)
21
21.5
21.5
21.5
22 } 5