| | |
|---|---|
| 7(a) | $\left[\frac{10!}{2!2!3!}=\right]151200$ |
| | |

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| | |
|---|---|
| 7(b) | **Method 1**[SC_ S _ _ _ _ _ _] |
| | $\frac{7!}{2!3!}\times 2\times 7$ |
| | = 5880 |
| | |
| | **Method 2** Considering each case separately [SC-S, S-CS] |
| | With Y $\frac{6!}{2!3!}\times 2\times 7=840$<br>With H $\frac{6!}{2!3!}\times 2\times 7=840$<br>With E $\frac{6!}{2!2!}\times 2\times 7$ = 2520<br>With L $\frac{6!}{3!}\times 2\times 7$ = 1680 |
| | 840 + 840 + 2520 + 1680 |
| | = 5880 |

| | |
|---|---|
| 7(b) | **Method 3** Considering each case separately [SC-S, S-CS] |
| | SCYS $\frac{7!}{2!3!}\times 2 = 840$<br>SCHS $\frac{7!}{2!3!}\times 2 = 840$<br>SCES $\frac{7!}{2!2!}\times 2 = 2520$<br>SCLS $\frac{7!}{3!}\times 2 = 1680$ |
| | 840 + 840 + 2520 + 1680 |
| | = 5880 |
| | |
| 7(c) | **Method 1** Total arrangements with Ss at ends – arrangements with |
| | $\frac{8!}{2!3!}-\frac{6!}{2!}$<br>[= 3360 – 360] |
| | = 3000 |
| | |

| | |
|---|---|
| 7(d) | **Method 1** |
| | [Number of ways with 3 Es =] $^{7}C_{2}$ (= 21) |
| | [Total number of ways is] $^{10}C_{5}$ (= 252) |
| | [Probability =] $\frac{21}{252}, \frac{1}{12}$ |
| | **Method 2** |
| | $\frac{3}{11}\times\frac{2}{6}\times\frac{3}{11}\times {}^{5}C_{2}$ |
| | |
| | [Probability =] $\frac{21}{252}, \frac{1}{12}$ |
| | |

| | |
|---|---|
| 7(a) | **Method 1** Total arrangements with 3 Os together – total arrangem |
| | $\frac{8!}{2!}-7!$ |
| | $= 15120$ |
| | **Method 2** ^ ^ OOO ^ ^ ^ , Arrangements with OOOs together an |
| | $6!\times\frac{7\times 6}{2}$ |
| | $= 15120$ |
| | |

| | |
|---|---|
| 7(b) | **Method 1** L _ _ _ _ _ L _ _ _ |
| | $\frac{8!}{3!}\times 4$ |
| | 26880 |
| | **Method 2** |
| | $^{8}P_{5}\times\frac{4!}{3!}$ |
| | 26880 |
| | |

| | |
|---|---|
| 7(c) | **Method 1** 1 – P(2 letters the same) |
| | $1-\left(\frac{3}{10}\times\frac{2}{9}+\frac{2}{10}\times\frac{1}{9}\right)$ |
| | $=\frac{41}{45}$, 0.911 |
| | **Method 2** $\mathrm{P}(\mathrm{O}\,\bar{\mathrm{O}})+\mathrm{P}(\mathrm{L}\,\bar{\mathrm{L}})+\mathrm{P}(\bar{\mathrm{O}}\bar{\mathrm{L}})$ |
| | $\frac{3}{10}\times\frac{7}{9}+\frac{2}{10}\times\frac{8}{9}+\frac{5}{10}\times\frac{9}{9}$ |
| | $=\frac{41}{45}$, 0.911 |

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<table>
<tr><td>7(c)</td><td><b>Method 3</b> Combination approach using OO and LL</td></tr>
<tr><td></td><td>[Probability =] $1-\frac{{}^{3}C_{2}+{}^{2}C_{2}}{{}^{10}C_{2}}$</td></tr>
<tr><td></td><td>$=\frac{41}{45}$, 0.911</td></tr>
<tr><td></td><td><b>Method 4</b> Combinations with scenarios $\mathrm{OL},\ \mathrm{O}\bar{\mathrm{L}},\ \bar{\mathrm{O}}\mathrm{L},\ \bar{\mathrm{O}}\bar{\mathrm{L}}$</td></tr>
<tr><td></td><td>
<table>
<tr><td>O and L</td><td>${}^{3}C_{1}\times{}^{2}C_{1}$</td><td>[6]</td></tr>
<tr><td>O and not L</td><td>${}^{3}C_{1}\times{}^{5}C_{1}$</td><td>[15]</td></tr>
<tr><td>Not O and L</td><td>${}^{5}C_{1}\times{}^{2}C_{1}$</td><td>[10]</td></tr>
<tr><td>Not O and not L</td><td>${}^{5}C_{2}$</td><td>[10]</td></tr>
</table>
[Probability = ] $\frac{6+15+10+10}{{}^{10}C_{2}}$</td></tr>
<tr><td></td><td>$=\frac{41}{45}$, 0.911</td></tr>
<tr><td></td><td></td></tr>
</table>

| | |
|---|---|
| 2(a) | **Method 1** total arrangements with As together – arrangements with |
| | $\frac{7!}{2!}-6!$ |
| | $n-6!$ |
| | 1800 |
| | |
| | **Method 2** arrangements of other 6 letters with the As together and tl |
| | $5!\times\frac{6\times5}{2}$ |
| | |
| | 1800 |
| | |

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| | |
|---|---|
| 2(b) | **Method 1** |
| | $[\mathrm{P}(X<6)=]\ 1-\left(\frac{3}{4}\right)^5\ ]$ |
| | $=0.763,\ \frac{781}{1024}$ |
| | |
| | **Method 2** |
| | $[\ \mathrm{P}(X<6)=]\ \frac{1}{4}+\left(\frac{1}{4}\right)\left(\frac{3}{4}\right)+\left(\frac{1}{4}\right)\left(\frac{3}{4}\right)^2+\left(\frac{1}{4}\right)\left(\frac{3}{4}\right)^3+\left(\frac{1}{4}\right)\left(\frac{3}{4}\right)^4$ |
| | $=0.763,\ \frac{781}{1024}$ |
| | |
| 2(c) | $\left(\frac{1}{4}\right)^2\left(\frac{3}{4}\right)^4\times5=\frac{405}{4096}$ |
| | $=0.0989$ |
| | |

| | |
|---|---|
| 5(a) | 3G 2P 1D: $^9C_3 \times {^6C_2} \times {^5C_1} = 6300$<br>4G 1P 1D: $^9C_4 \times {^6C_1} \times {^5C_1} = 3780$<br>5G 0P 1D: $^9C_5\ [\times {^6C_0}] \times {^5C_1} = 630$<br>Condone $^5C_1 = 5$ and $^6C_1 = 6$ |
| | Total: 10710 |
| | |
| 5(b) | Ways of selecting 1st band: $^9C_3 \times {^6C_1} \times {^5C_1} = 2520$<br>Ways of selecting 2nd band: $^6C_3 \times {^5C_1} \times {^4C_1} = 400$<br>Ways of selecting 3rd band: $1 \times {^4C_1} \times {^3C_1} = 12$<br>[Total number of ways =] $2520 \times 400 \times 12 =$ |
| | 12096000 |
| | |