

2010 Mathematics (2)

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Section A

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Section B

11S

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12T

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13X

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14Y

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15R

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16S

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17X

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Solution(s):

From user: ar857

17X 2010 Paper 2

a) ① 20 r : 30 g ② 180 r : 170 g

i) $\frac{1}{2} \cdot \frac{2}{5} + \frac{1}{2} \cdot \frac{18}{35} = \frac{7+18}{35} = \frac{25}{35} \leftarrow P(\cdot)$

ii) $P(X|R) = \frac{P(X \cap R)}{P(R)} = \frac{\frac{1}{2} \cdot \frac{2}{5}}{\frac{25}{35}} = \frac{7}{25}$

b) 2 B 37 W 61 C
 $\frac{\binom{3}{2} \cdot \binom{37}{3} \cdot \binom{61}{4}}{\binom{100}{7}}$

c) $P(B) = P(B|A)P(A) + P(B|\bar{A})P(\bar{A})$

fixed fixed determines min+max fixed

$P(B)_{\min}$ if $P(B|\bar{A})=0$ $P(B)_{\min} = P(B|A)P(A) + (1-P(A)) \cdot 0 = P(B|A)P(A)$

$P(B)_{\max}$ if $P(B|\bar{A})=1$ $P(B)_{\max} = P(B|A)P(A) + 1 - P(A)$ cycle done

d) $P(B) = P(B|A)P(A) + P(B|\bar{A})P(\bar{A})$

fixed fixed

$P(B)_1 = P(B|\bar{A})$ if $P(A)=0, P(\bar{A})=1$

$P(B)_2 = P(B|A)$ if $P(\bar{A})=0, P(A)=1$

if $P(B|\bar{A}) > P(B|A)$ then $P(B)_1$ is max $P(B)_2$ is min

if $P(B|A) > P(B|\bar{A})$ then $P(B)_2$ is max $P(B)_1$ is min

good

18Y

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Solution(s):

From user: ar857

2010184

a) $\int_{-1}^1 \int_{-2}^2 \int_{-3}^3 (x^2 + y^2 + z^2) dz dy dx = \int_{-1}^1 \int_{-2}^2 (6x^2 + 6y^2 + 18) dy dx$
 $= \int_{-1}^1 (24x^2 + 72 + 32) dx = \frac{48}{3} + 2 \times (72 + 32) = 224$

b) $\int_0^1 \int_0^1 e^{x^2} dx dy$
 $= \int_0^1 \int_0^x e^{x^2} dy dx = \int_0^1 x e^{x^2} dx = \frac{e-1}{2}$

c) $z = r^2$
 $z = 9 - r^2$
 $r = \sqrt{z}$
 $V = 2 \times \int_0^{2\pi} \int_0^{9/2} \int_0^{\sqrt{z}} r dr dz d\theta$
 $= 2 \cdot 2\pi \cdot \int_0^{9/2} \frac{z}{2} dz = 2\pi \cdot \frac{81}{4} \cdot \frac{1}{2} = \frac{81\pi}{4}$

Handwritten notes and diagrams:
 - A small 3D plot of a cone-like surface.
 - A diagram of a circle in the $r-z$ plane with radius 3 and height 9 .
 - A red arrow pointing to the volume element dV in cylindrical coordinates.
 - A red arrow pointing to the expression $z = r^2$ and $r = \sqrt{z}$.

19R*

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20T*

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