**Department of Mathematics and Statistics AMAT 219 - QUIZ 4 - Thursday, March 23, 2006**

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45 Minutes, Open Book, NO Calculators

To obtain credit you need to show your work. Work should be neat and organized.

1. Find the parametric equations of the straight line perpendicular to the plane $x - 2y - 3z = 7$ and containing the point $(-1, 2, 1)$.

$(1,-2,-3)$ is perpendicular vector to plane, so a direction vector for line.

$x(t) = -1 + t$

$y(t) = 2 - 2t$

$z(t) = 1 - 3t$

2. Find the equation of the plane containing the points $(0,1,2)$, $(2,3,-1)$, and $(1,1,4)$.

$(2-0, 3-1, -1-2) = (2,2,-3)$ are two

$(1-0, 1-1, 4-2) = (1,0,2)$

vectors in the plane so $(2,2,-3)\times(1,0,2) = (4,-5,-2)$ is normal to the plane.

Eq. of plane is $4x - 5y - 2z = -11$

3. What is the line of intersection of the planes $2x - y + 3z = 4$ and $3x - 2y + z = 1$.

$(-2)(\text{equation}①) + \text{equation}②$

$$\begin{array}{r} -4x + 2y - 6z = -8 \\ + \;\; 3x - 2y + z = 1 \\ \hline -x \quad\quad - 5z = -7 \end{array}$$

, so $x + 5z = 7$

Let $z = t$, then $x = 7 - 5t$ and from ①, $y = 2x + 3z - 4$

$= 2(7-5t) + 3t - 4$

$= 10 - 7t.$

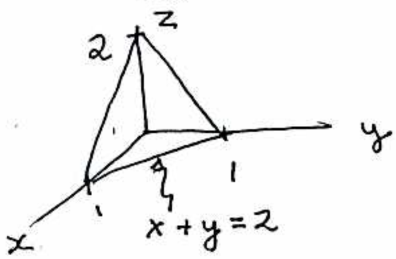
line. $\begin{cases} x(t) = 7 - 5t \\ y(t) = 10 - 7t \\ z(t) = t \end{cases}$

4. Find the plane containing the point $(0,1,2)$ and not meeting the two lines $l_1(t) = (1,2,0) + t(0,-2,1)$ and $l_2(t) = (1,1,-2) + t(1,1,-1)$.

For a line and a plane not to meet the direction vector of the line must be perpendicular to the normal vector of the plane. So, a normal vector of the plane is $(0,-2,1) \times (1,1,-1) = (1,1,2)$

and the plane is $x + y + 2z = 5$

5. Evaluate $\iiint_E (-x+2)\, dV$ where $E$ is the solid enclosed by the planes $x = 0, .y = 0, z = 0, x+y+2z = 2$.




$$\int_0^1 \int_0^{2-x} \int_0^{\frac{2-x-y}{2}} (2-x)\, dz\, dy\, dx$$

$$= \int_0^1 \int_0^{2-x} (2-x)\left(\frac{2-x-y}{2}\right) dy\, dx$$

$$= \frac{1}{2}\int_0^1 \left[(2-x)\left(2-x-\frac{y}{2}\right) y\right]_0^{2-x} dx = \frac{1}{2}\int_0^1 \frac{(2-x)^3}{2}\, dx$$

$$= \left.\frac{-(2-x)^4}{4\cdot 2\cdot 2}\right|_0^1 = 1$$

| Surname | Given Names | Lab # | Mark (20) |
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I agree that this paper may be placed at the front of the classroom for pick-up.

Please initial: Yes__________ or No__________