SAMPLE QUESTIONS FOR MIDTERM 2 (Part 1)

1) Find the surface area of the portion of the cone $z = \sqrt{x^2+y^2}$ below the plane $z=4$
(ANSWER: $16\pi\sqrt{2}$)

2) Find the surface area of the portion of the paraboloid $z=x^2+y^2$ below the plane $z=4$.
(ANSWER:

3) Find the surface area of the portion of the plane $3x+y+2z=6$ inside the cylinder $x^2+y^2=4$.
(ANSWER: $2\pi\sqrt{14}$)

4) Find the surface area of the portion of the cone $z=\sqrt{x^2+y^2}$ above the triangle with vertices $(0,0)$, $(1,0)$, $(1,1)$.
(ANSWER: $\frac{\sqrt{2}}{2}$)

5) Find the surface area of the portion of the hemisphere $z=\sqrt{4-x^2-y^2}$ above the plane $z=1$.
(ANSWER: 4π)

6) Evaluate $\iint\limits_S xz\,dS$ where S is the portion of the plane $z=2x+3y$ above the rectangle $1\leq x\leq 2$, $1\leq y\leq 3$
(ANSWER: $\frac{82\sqrt{14}}{3}$)

7) Evaluate $\iint\limits_S (x^2+y^2+z^2)^{3/2}\,dS$ where S is the lower hemisphere $z=-\sqrt{9-x^2-y^2}$.
(ANSWER: 486π)

8) Evaluate $\iint\limits_S (x^2+y^2-z)\,dS$ where S is the portion of the paraboloid $z=4-x^2-y^2$ between $z=1$ and $z=2$.
(ANSWER: $\frac{\pi}{10}\left(81-13\sqrt{13}\right)$

9) Use Divergence Theorem to compute $\iint_S \vec{F}\cdot\vec{n}\,dS$ where

S is the boundary of Q, the solid region bounded by $x+y+2z=2$ (in the first octant) and the coordinate planes, $\vec{n}$ is the outward unit normal vector and $\vec{F}=\langle 2x-y^2,\ 4xz-2y,\ xy^3\rangle$.

(ANSWER : 0)

10) Use Divergence Theorem to compute $\iint_S \vec{F}\cdot\vec{n}\,dS$ where

S is the boundary of Q, the solid region bounded by the planes $x=0$, $x=2$, $y=1$, $y=2$, $z=-1$, $z=2$, $\vec{n}$ is the outward unit normal vector and $\vec{F}=\langle y^3-2x,\ e^{xz},\ 4z\rangle$.

(ANSWER: 12)

11) Use Divergence Theorem to compute $\iint_S \vec{F}\cdot\vec{n}\,dS$ where

S is the boundary of Q, the solid region bounded by $z=x^2+y^2$ and $z=4$, $\vec{n}$ is the outward unit normal vector, and

$\vec{F}=\langle x^3,\ y^3-z,\ xy^2\rangle$

⟨ANSWER: 32π⟩

12) Use Divergence Theorem to compute $\iint_S \vec{F}\cdot\vec{n}\,dS$ where

S is the boundary of Q, the solid region bounded by $z=\sqrt{x^2+y^2}$ and $z=\sqrt{2-x^2-y^2}$, $\vec{n}$ is the outward unit normal vector and

$\vec{F}=\langle x^2,\ z^2-x,\ y^3\rangle$.

⟨ANSWER: 0⟩

13) Use Divergence theorem to compute $\iint_S \vec{F}\cdot\vec{n}\,dS$ where

S is the boundary of Q, the solid region bounded by $z=\sqrt{x^2+y^2}$ and $x^2+y^2=1$ and $z=0$, $\vec{n}$ is the outward unit normal vector,

and $\vec{F}=\langle y^2,\ x^2z,\ z^2\rangle$.

(ANSWER: $\frac{\pi}{2}$).