ĐỀ THI CUỐI KÌ GIẢI TÍCH 2/FINAL EXAM ON CALCULUS 2
HP/Course ID: MI1124(E), Thời gian/Duration: 90 phút/Minutes

Q1. Given $u = x\left(\sin(\frac{\pi y}{2}) + \arctan z\right)$. Evaluate the directional derivative
$$\frac{\partial u}{\partial \overrightarrow{AB}}(A), \text{ where } A(2;1;1), B(1;3;-1).$$

Q2. Find the tangent line and the normal plane of the curve
$(C): \begin{cases} x^2+y^2=1 \\ z = x+y \end{cases}$ at the point $A\left(\frac{1}{\sqrt{2}}; \frac{1}{\sqrt{2}}; \sqrt{2}\right)$.

Q3. Find the area of the domain bounded by
$$x^2+y^2=2x, y=x, y=x\sqrt{3}.$$

Q4. Evaluate $\iiint\limits_{\Omega} xzdxdydz$, where Ω is determined by the inequalities
$$0 \le y \le 1,\ y^2 \le x \le 1,\ x+y \le z \le \sqrt{x+y}.$$

Q5. Evaluate $\iiint\limits_{\Omega} \sqrt{x^2+y^2}dxdydz$, where V is bounded by the surfaces $z = 2-\sqrt{x^2+y^2}$, $x^2+y^2=1$ and the Oxy plane.

Q6. Evaluate $\int\limits_{\mathcal{C}} xydx + (x+y)dy$, where $\mathcal{C}: y = 2x^2+1$ from $A(-1;3)$ to $B(0;1)$.

Q7. Find the area of the part of the cone $z = \sqrt{x^2+y^2}$ that contained in the cylinder $x^2+y^2=2y$.

Q8. Let $\mathcal{C}$ be the right part of the circle $x^2+y^2=2x$ from $A(1;-1)$ to $B(1;1)$. Evaluate
$$I = \int\limits_{\mathcal{C}} (e^x\sin(2y) + 3x^2y^2 - y^2)dx + (2e^x\cos(2y) + 2x^3y)dy.$$

Q9. Find the flux of the vector field $\overrightarrow{F} = x^3\overrightarrow{i} + yz^4\overrightarrow{k}$ across the surface $(S): x^2+y^2+z^2=1$, with the inward direction.

Q10. Evaluate $I = \int\limits_{C} \frac{x^2+y^2+x}{\sqrt{x^2+y^2}}dx + \frac{xy+\sqrt{x^2+y^2}}{\sqrt{x^2+y^2}}dy$,
where $C: \frac{x^2}{4} + \frac{y^2}{9} = 1$, couterclockwise.

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Q1. Given $u = x\left(\cos(\frac{\pi y}{2}) + \arctan z\right)$. Evaluate the directional derivative
$$\frac{\partial u}{\partial \overrightarrow{AB}}(A), \text{ where } A(1;1;0), B(0;3;-2).$$

Q2. Find the tangent line and the normal plane of the curve
$(C): \begin{cases} x^2+y^2=1 \\ z = x-y \end{cases}$ at the point $A\left(\frac{1}{\sqrt{2}}; \frac{1}{\sqrt{2}}; 0\right)$.

Q3. Find the area of the domain bounded by
$$x^2+y^2=2y,\ y=x,\ y=x\sqrt{3}.$$

Q4. Evaluate $\iiint\limits_{\Omega} yzdxdydz$, where Ω is determined by the inequalities
$$0 \le x \le 1,\ x \le y \le 1,\ x+y \le z \le \sqrt{x+y}.$$

Q5. Evaluate $\iiint\limits_{\Omega} \sqrt{x^2+y^2}dxdydz$, where V is bounded by the surfaces $z = 1+\sqrt{x^2+y^2}$, $x^2+y^2=1$ and the Oxy plane.

Q6. Evaluate $\int\limits_{\mathcal{C}} (x+y)dx + xydy$, where
$\mathcal{C}: y = x^2-1$ from $A(-1;0)$ to $B(0;-1)$.

Q7. Find the area of the part of the cone $z = -\sqrt{x^2+y^2}$ that contained in the cylinder $x^2+y^2=2y$.

Q8. Let $\mathcal{C}$ be the upper part of the circle $x^2+y^2=2x$ from $A(2;0)$ to $B(0;0)$. Evaluate
$$I = \int\limits_{\mathcal{C}} (e^x\sin(2y) + 3x^2y^2 - y^2)dx + (2e^x\cos(2y) + 2x^3y)dy.$$

Q9. Find the flux of the vector field $\overrightarrow{F} = y^3\overrightarrow{j} + xz^3\overrightarrow{k}$ across the surface $(S): x^2+y^2+z^2=1$, with the inward direction.

Q10. Evaluate $I = \int\limits_{C} \frac{x^2+y^2+x}{\sqrt{x^2+y^2}}dx + \frac{xy+\sqrt{x^2+y^2}}{\sqrt{x^2+y^2}}dy$,
where $C: \frac{x^2}{4} + \frac{y^2}{9} = 1$, clockwise.