<table>
<tr><th>Câu</th><th>Đáp án</th><th>Thang điểm</th></tr>
<tr><td rowspan="2">1a
(1,5đ)</td><td>$I=\int_0^1 dy\int_y^{2-y} f(x,y)dx$
$=\int_0^1 dx\int_0^x f(x,y)dy+\int_1^2 dx\int_0^{2-x} f(x,y)dy$</td><td>0,5đ
0,5đ</td></tr>
<tr><td>Tính diện tích:
$DT=\int_0^1 dy\int_y^{2-y} dx=1$</td><td>0,5đ</td></tr>
<tr><td rowspan="4">1b
(1,5đ)</td><td>Descartes:
$K=\int_{-2}^{2} dx\int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} dy\int_{\sqrt{x^2+y^2}}^{4-\sqrt{x^2+y^2}} f\left(x,y,z\right)dz$</td><td>0,25đ</td></tr>
<tr><td>Trụ:
$I=\int_0^{2\pi} d\varphi\int_0^2 dr\int_r^{4-r} r.f\left(r\cos\varphi,r\sin\varphi,z\right)dz$</td><td>0,25đ</td></tr>
<tr><td>$V=\int_0^{2\pi} d\varphi\int_0^2 dr\int_r^{4-r} rdz=\frac{16\pi}{3}$</td><td>0,5đ</td></tr>
<tr><td>$DienTich=DT_1+DT_2=\iint_{S_1:z=\sqrt{x^2+y^2}} dS+\iint_{S_1:z=4-\sqrt{x^2+y^2}} dS$
$=\iint_{Dxy:x^2+y^2\le 4}\sqrt{2}dxdy+\iint_{Dxy:x^2+y^2\le 4}\sqrt{2}dxdy$
$=2\sqrt{2}\,Dien\,Tich\,(D_{xy})=2\sqrt{2}.\pi.2^2=8\sqrt{2}\pi$</td><td>0,5đ</td></tr>
<tr><td>1c
(1,5đ)</td><td>Đặt $K_1=\int_{BA}(yx^2-x)dx+(2y-xy^2)dy$
với $\begin{cases} BA: y=0\Rightarrow dy=0\\ x_B=2, x_A=-2\end{cases}\Rightarrow K_1=\int_2^{-2}-xdx=0$
$K+K_1\overset{Green}{=}\int_{(C)\cup\overline{BA}}=-\iint_{x^2+y^2\le 4,\,y\ge 0}\left(-x^2-y^2\right)\mathrm{dxdy}=\int_0^{\pi} d\varphi\int_0^2 r^2.rdr=4\pi$
$\Rightarrow K=\int_{(C)\cup\overline{BA}}-\int_{\overline{BA}}=4\pi-0=4\pi$</td><td>0,5đ
0,5đ
0,5đ</td></tr>
<tr><td>2a
(1đ)</td><td>$\overrightarrow{rot}\overrightarrow{F}=(0-2yz)\vec{i}+(-2-2xz)\vec{j}+(0-2xy)\vec{k}$
$div\overrightarrow{F}=P_x^{'}+Q_y^{'}+R_z^{'}=x^2+y^2+z^2+1$</td><td>0,5đ
0,5đ</td></tr>
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2b (1,5đ)	Đặt $W_1 = \iint\limits_{S_0:z=0} (xy^2-2z)dydz+(yz^2+1)dxdz+(zx^2+z)dxdy$ $= -\iint\limits_{x^2+y^2\le 1} 0dxdy = 0$ $W + W_1 = \iint\limits_{S\cup S_0} (xy^2-2z)dydz+(yz^2+1)dxdz+(zx^2+z)dxdy$ $= \iiint\limits_V \left(x^2+y^2+z^2+1\right)dxdydz = \int\limits_0^{2\pi} d\varphi \int\limits_0^{\pi/2} d\theta \int\limits_0^1 (\rho^2+1).\rho^2 \sin\theta d\rho = \frac{16\pi}{15}$ $W = \iint\limits_{S\cup S_0} - \iint\limits_{S_0} = \frac{16\pi}{15} - 0 = \frac{16\pi}{15}$	**0,5đ** **0,5đ** **0,5đ**
3a (1,5đ)	Đặt $P = e^x y - \sin y + 2x; Q = e^x - x\cos y$ Vì $P_y = Q_x = e^x - \cos y$ nên phương trình là phương trình vi phân toàn phần.	**0,5đ**
	$\begin{cases} u_x = P = e^x y - \sin y + 2x \\ u_y = Q = e^x - x\cos y \end{cases} \Rightarrow u(x,y) = e^x y - x\sin y + x^2$	**0,75đ**
	Nghiệm của pt là: $e^x y - x\sin y + x^2 = C$	**0,25đ**
3b (1,5đ)	Pt đặc trưng: $k^2 - k = 0 \Leftrightarrow k = 0; k = 1$ Nghiệm tổng quát pt $y'' - y' = 0$ là $Y = C_1 + C_2 e^x$	**0,25đ**
	Nghiệm riêng pt $y'' - y' = x^2$ có dạng: $y_{r_1} = x(Ax^2 + Bx + C)$ Suy ra $y_{r1} = -\frac{1}{3}x^3 - x^2 - 2x$ Nghiệm riêng pt $y'' - y' = \sin x$ có dạng: $y_{r_2} = D\cos x + E\sin x$ Suy ra $y_{r2} = \frac{1}{2}\cos x - \frac{1}{2}\sin x$	**0,5đ** **0,5đ**
	Nghiệm tổng quát pt ban đầu là $y = Y + y_{r1} + y_{r2} = C_1 + C_2 e^x - \frac{1}{3}x^3 - x^2 - 2x + \frac{1}{2}\cos x - \frac{1}{2}\sin x$	**0,25đ**