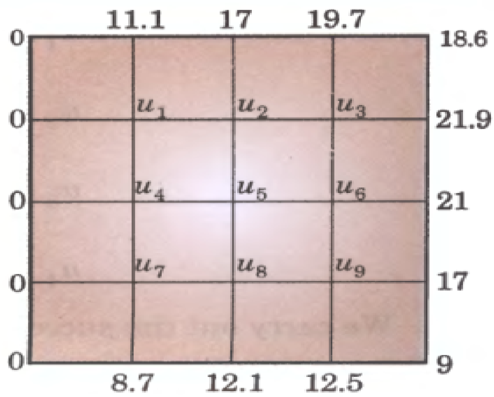
The altitude of a right circular cone is 15 cm and is increasing at 0.2cm/s. The radius of the base is 10 cm and is decreasing at 0.3 cm/s. Find the volume changing?
Determine the first and second partial derivatives of $z=x^3+y^3-3axy$
Evaluate $\iiint_D dx\,dy\,dz$, where $D: x^2+y^2 \le 1, 0 \le z \le 1$
Evaluate the integral $\int_0^4 \int_0^{\sqrt{4y-y^2}} x^2\,dx\,dy$ by converting to polar coordinates
Determine the directional derivative of $\varphi = x^2 - 2y^2 + 4z^2$ at (1,1,-1) in the direction of $2i + j - k$.
Obtain the scalar potential φ if $F = (y+z)i + (z+x)j + (x+y)k$ is irrotational.
Apply Lagrange's method, solve the linear partial differential equation $x(y-z)p + y(z-x)q = z(x-y)$
Obtain the partial differential equation from the relation $F(xy+z^2, x+y+z) = 0$ by eliminating the arbitrary function.
Obtain the Taylors series expansion for the function $f(x,y) = \sin xy$ in powers of $(x-1)$ and $(y+2)$.
If $u = x^2 - 2y, v = x+y+z, w = x-2y+3z$ then compute $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.
Evaluate $\iiint_E \sqrt{x^2+y^2}\,dx\,dy\,dz$ where E is the region that lies inside the cylinder $x^2+y^2=16$ and between the planes $z=-5$ and $z=4$.
Evaluate $\iint_R (x^2+y^2)\,dA$ where R be the region lying between two circles $x^2+y^2=1$ and $x^2+y^2=5$
Using Greens Theorem evaluate $\int_C [(y-\sin x)dx + \cos x dy]$ where C is plane triangle enclosed by the lines y=0, and y=(2/π)x, x=0, x=π/2
Evaluate the surface integral $\iint_S F.ndA$, for F=[x^2, 0,z^2], S surface of the box $\lvert x \rvert \le 1$, $\lvert y \rvert \le 3$ and $0 \le z \le 2$.
Apply Charpit's method, solve $z^2 = pqxy$
Using method of Separation of variables, find the solution of the partial differential equation $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial y}$ $given\,t\,hat\,u(x,0) = 8e^{-3x}$.
a). Determine the total work done in moving a particle in a force field given by $F = 3xy\,i - 5z\,j + 10x\,k$ along the curve $x = t^2+1, y = 2t^2, z = t^3$ from t=1 to t=2. b). A string is stretched and fastened to two points l apart. Motion is started by displacing the string into the form $y = 2k(lx - x^2)$ from which it is released at time t=0. Determine the displacement of any point on the string at a distance of x from one end at a time t.
Apply finite difference method to find the solution to the Laplace's equation $u_{xx} + u_{yy} = 0$ given that Fig.



Obtain the second partial derivative with respect x and t, when $z=f(x+ct)+\varphi(x-ct)$

The altitude of a right circular cone is 15 cm and is increasing at 0.2cm/s. The radius of the base is 10 cm and is decreasing at 0.3 cm/s. Determine the volume changing?

Evaluate the double integral $f(x,y)=x^2y^2$ over the region bounded by the lines $x=y, x=0, y=0$ and $y=5$.

Determine the area bounded by the parabola $y=x^2$ and the line $y=x+2$.

Obtain the constants a, b, c, if the vector $A=(x+2y+az)i+(bx-3y-z)j+(4x+cy+2z)k$ is irrotational.

Obtain the direction derivative of $\varphi=xy+yz+zx$ at A in the direction of AB where A=(1,2,-1) , B=(1,2,3) .

Determine the partial differential equation from the relation $z=f_1(x+t)+f_2(x+t)$ by eliminating the arbitrary functions.

Obtain the general solution of the partial differential equation $x(z^2-y^2)p+y(x^2-z^2)q=z(y^2-x^2)$.

Obtain the Taylors series expansion for the function e^{xy} in the neighborhood of (1, 1).

Determine the minimum value of $x^2+y^2+z^2$ subject to the condition $xyz=27$

Calculate $\iint r^3\, dr\, d\theta$ over the area included between the circles $r=2\sin\theta$ and $r=4\sin\theta$.

Determine the area of the region between $y=0$ and $y=\sqrt{2-x^2}$.

Using Greens Theorem evaluate $\int_C [(x^2-2xy)dx+(x^2y+3)dy]$ where C is rectangle with vertices (0,0), (π,0), (π,1) and (0,1).

By using appropritiate theorem, evaluate $\int_S (yz\, dx+zx\, dy+xy\, dz)$, where S is the surface of the sphere $x^2+y^2+z^2=a^2$ in the first octant.

Apply Charpit's method to solve $z=p^2x+q^2y$

A tightly stretched string with fixed end-points x=0 and x=10 cm is initially in its equilibrium position and at every point x on it is given as initial velocity $g(x)=\lambda x(10-x)$. Determine the displacement of the string at any distance x from one end at any time t.

a). Calculate this line integral by Stokes's theorem for the given F=[z^3,x^3,y^3] and *C* is the circle x=2, $y^2+z^2=9$ b.

b). Obtain the solution of the equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$ which satisfies the conditions $u(0,y)=u(l,y)=u(x,0)=0$ and $u(x,a)=\sin\frac{n\pi x}{l}$.

Apply finite difference method to find the solution to the Laplace's equation $u_{xx}+u_{yy}=0$ given that Fig.

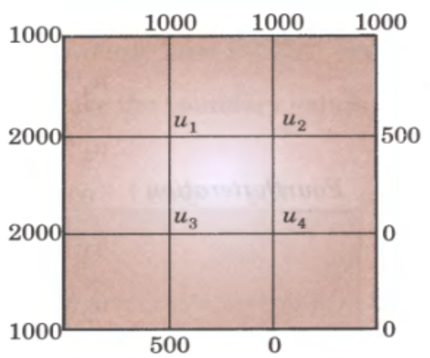


Fig. 33.7

Given that $u = x^2 + y^2 + z^2$, determine the partial derivative $xu_x + yu_y + zu_z$

At a given instant the major and minor axes of an ellipse are 60 cm and 40 cm respectively and they are increasing at the rate of 2 cm/s and 3 cm/s respectively. Determine the rate at which area is increasing at the instant.

Determine the area of the region R given by $R: \{(x, y): 0 \le y \le \sqrt{1 - x^2}\}$.

Evaluate $\iint_R (x + y)^2 \, dA$, where R is the region given by $0 \le x \le 2, x \le y \le 2x.$

Check whether the vector function $\vec{v}=[x-y, y-z, z-x]$ is irrotational?

Determine p, if $F = (x + 3y)i + (y - 2z)j + (x + pz)k$ is solenoid.

Determine the partial differential equation from the relation $F(x + y + z, x^2 + y^2 + z^2) = 0$ by eliminating the arbitrary function.

Apply Lagrange's method, solve the linear partial differential equation $(x^2 - y^2 - z^2)p + 2xyq = 2xz$.

Obtain the Taylors series expansion for the function $e^x \sin y$ in powers of x and y.

Determine the maximum and minimum values of $x^3+3xy^2-3x^2-3y^2+4$.

Compute the volume of the region in $\Re^3$ bounded by the paraboloid $z = x^2 + y^2$, the cylinder $x^2 + y^2 = 9$ and the plane $z = 0.$

Evaluate the double integral $\iint_R xy \, dx\, dy,$ where R is the region bounded by the x- axis, the line $y = 2x$ and the parabola $y = x^2 / 4a$.

Using Greens Theorem evaluate $\int_C [(x^2 y) dx + x^2 dy]$ where C is the area bounded by the equations x = y, x=1, y=0, y=1.

By using appropriate theorem, evaluate $\int_C ydx+zdy+xdz$, where C is the curve of intersection of $x^2+y^2+z^2=a^2$ and $x + z = a$.

Apply Charpit's method to solve $ypq + xp^2 = 1$.

An insulated rod of length L has its ends A and B maintained at 0^0C and 100^0C, until steady state conditions prevail. If the ends A and B is suddenly reduced to 40^0Cand 60^0C and maintained at these values, obtain the transient distribution of the rod

a). Evaluate the surface integral $\iint_S F.ndA$, for $F=[e^x, e^y, e^z]$, S surface of the box $|x|\leq 1$, $|y| \leq 1$and$|z| \leq 1$.

b). A homogeneous rod of conducting material of length 300cm as its ends kept at zero temperature and the temperature initially is

$$u(x,0)=\begin{cases} x & 0\leq x\leq 50 \\ 200-x & 50\leq x\leq 300 \end{cases}$$

. Obtain the temperature u(x, t) at any time t.

Apply finite difference method to find the solution to the Laplace's equation $u_{xx}+u_{yy}=0$ given that Fig.