Bangalore Institute of Technology

Department of Mathematics

Questions for Lab internals (EEE stream)

a	Python program to find $y(0.1)$ for $\frac{dy}{dx} = y^2 + x^2$, $y(0) = 1$ using *Taylor's series* method considering up to third degree terms.
a	Python program to find y at $x = 0.3$ for $\frac{dy}{dx} - 2y = 3e^x$ and $y(0) = 0$ using *Taylor's series* method considering up to third degree terms.
a	Python program to find $y(0.1)$ by *Taylor's series* method when $y' + 4y = x^2$, $y(0) = 1$
a	Python program to solve by *Modified Euler's* method: $y' = e^{-x}$ with $y(0) = -1$, at $x = 0.2$.
a	Python program to solve by *Modified Euler's* method: $y' = x + y$, $y(0) = 1$, at $x = 0.1$.
a	Python program to solve by *Milne's predictor and corrector* method: $\frac{dy}{dx} = x^2 + \frac{y}{2}$ at $y(1.4)$ Given that $y(1) = 2$, $y(1.1) = 2.2156$, $y(1.2) = 2.4649$, $y(1.3) = 2.7514$. Use *corrector* formula thrice
a	Python program to solve by *Milne's predictor and corrector* method: $\frac{dy}{dx} = x^2 + y^2$ at $y(0.4)$ Given that $y(0) = 1$, $y(0.1) = 1.1113$, $y(0.2) = 1.2507$, $y(0.3) = 1.426$. Use *corrector* formula thrice
a	Python program to find $y(0.1)$ by *Runge Kutta* method when $y' = x - y^2$, $y(0) = 1$
b	Python program for *Green's theorem* to evaluate $\oint_C \left[\left(xy + y^2 \right) dx + \left(x^2 \right) dy \right]$, where c is the closed curve bounded by $y = x$ and $y = x^2$.
a	Python program to evaluate by *Runge Kutta* method: $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$ at $x = 0.2$
b	Python program for *Green's theorem* to evaluate $\oint_C \left[(x + 2y) dx + (x - 2y) dy \right]$, where c is the region bounded by the coordinate axes, the lines $x = 1$ and $y = 1$.

a	Python program to find $y(1.2)$ by *Runge Kutta* method when $\frac{dy}{dx}=1+\frac{y}{x}$, $y(1)=2$
b	Python program to find the image of vector $(4,0)$ when it is rotated by 90^0.
a	Python program to verify the *rank-nullity* theorem for the linear transformation $T:R^3\to R^3$ defined by $T(x,y,z)=(x+4y+7z,2x+5y+8z,3x+6y+9z)$
b	Python program for *Green's theorem* to evaluate $\oint_C[(x+2y)dx+(x-2y)dy]$, where c is the region bounded by the coordinate axes, the lines $x=1$ and $y=1$.
a	Python program to verify the *rank-nullity* theorem for the linear transformation $T:R^3\to R^3$ defined by $T(x,y,z)=(x+y,x-y,2x-z)$
b	Python program for *Green's theorem* to evaluate $\oint_C[(xy+y^2)dx+(x^2)dy]$, where c is the closed curve bounded by $y=x$ and $y=x^2$.
a	Python program to verify the *rank-nullity* theorem for the linear transformation $T:R^3\to R^3$ defined by $T(x,y,z)=(x+y,y+z,z+x)$
b	Python program for *Green's theorem* to evaluate $\oint_C[(x+2y)dx+(x-2y)dy]$, where c is the region bounded by the coordinate axes, the lines $x=1$ and $y=1$.
a	Python program to verify the *rank-nullity* theorem for the linear transformation $T:R^3\to R^3$ defined by $T(x,y,z)=(x+y+z,2x+3z,x+2y+4z)$
b	Python program for *Green's theorem* to evaluate $\oint_C[(x+2y)dx+(x-2y)dy]$, where c is the region bounded by the coordinate axes, the lines $x=1$ and $y=1$.
a	Python program to verify the *rank-nullity* theorem for the linear transformation $T:R^3\to R^3$ defined by $T(x,y,z)=(x-y+2z,y,x+2y+z)$
b	Python program for *Green's theorem* to evaluate $\oint_C[(xy+y^2)dx+(x^2)dy]$, where c is the closed curve bounded by $y=x$ and $y=x^2$.

a	Python program to find the image of the vector $(5,0)$ when it is rotated by 90^0 then stretched horizontally.
b	Python program to find gradient of $\phi = x^2yz$
a	Python program to find the image of vector $(2,3)$ when it is stretched horizontally
b	Python program to find gradient of $\phi = x^4 + y^4 + z^4$
a	Python program to find div $\vec{F} = x^2yz\hat{\imath} + y^2xz\hat{\jmath} + z^2xy\hat{k}$
b	Python program to find the image of vector $(4,0)$ when it is rotated by 90^0.
a	Python program to find the image of vector $(2,4)$ when it is stretched vertically.
b	Python program to find gradient of $\phi = x^4 + y^4 + z^4$
a	Python program to find curl $\vec{F}$, given that $\vec{F} = x^3\hat{\imath} + y^3\hat{\jmath} + z^3\hat{k}$
b	Python program to find the image of vector $(3,3)$ when it is reflected about y-axis.
a	Python program to find the image of vector $(3,4)$ when it is reflected about y-axis.
b	Python program to find div $\vec{F} = (x + 3y)\hat{\imath} + (y - 3z)\hat{\jmath} + (x - 2y)\hat{k}$
a	Python program to find the image of vector $(0,5)$ when it is rotated by 90^0.
b	Python program to find gradient of $\phi = x^2y^2 + y^2z^3$
a	Python program to find the image of vector $(3,3)$ when it is stretched horizontally.
b	Python program to find gradient of $\phi = xy^2 + yz$
a	Python program to find the image of vector $(4,5)$ when it is reflected about y-axis.
b	Python program to find curl $\vec{F}$, given that $\vec{F} = x^3\hat{\imath} + y^3\hat{\jmath} + z^3\hat{k}$
a	Python program to find $y(0.1)$ by *Runge Kutta* method when $y' = x - y^2$, $y(0) = 1$

b	Python program to find gradient of $\phi = x^4 + y^4 + z^4$
a	Python program to evaluate by *Runge Kutta* method: $\frac{dy}{dx} = 3x + \frac{y}{2}$, $y(0) = 1$ at $x = 0.2$
b	Python program to find gradient of $\phi = x^2 - 2y^2 + 4z^2$
a	Python program to find div $\vec{F}$, given that $\vec{F} = x^3\hat{\imath} + y^3\hat{\jmath} + z^3\hat{k}$
b	Python program to find the image of vector $(4,5)$ when it is reflected about y-axis.
a	Python program to find divergence of $\vec{F} = x^2yz\hat{\imath} + y^2xz\hat{\jmath} + z^2xy\hat{k}$
b	Python program to find the image of vector $(3,3)$ when it is stretched horizontally.
a	Python program to find curl $\vec{F}$, given that $\vec{F} = x^3\hat{\imath} + y^3\hat{\jmath} + z^3\hat{k}$
b	Python program to find the image of vector $(0,5)$ when it is rotated by 90^0.
a	Python program to find div $\vec{F}$, given $\vec{F} = x^2\hat{\imath} + 3y\hat{\jmath} + x^3\hat{k}$
b	Python program to find the image of vector $(3,4)$ when it is reflected about y-axis.