Quiz 1 Let $\mathbf{r}(t)=\langle a \cos t, a \sin t, c t\rangle$. Find $\mathbf{T}, \mathbf{N}, \mathbf{B}, \kappa, \tau$
Quiz 2 Let $\mathbf{F}(x, y)=\left\langle 3 x^{2}-2 x y, 2 y^{2}-x^{2}\right\rangle$. Find $\int_{C} \mathbf{F} \cdot d \mathbf{r}$ form $(0,0)$ to $(1,1)$ for $C$ along $y=x$ and $y=x^{2}$. Find the scalar potential $\phi$ of $\mathbf{F}$. Show that if $\mathbf{F}=\nabla \phi$ then $\int_{C} \mathbf{F} \cdot d \mathbf{r}$ is independent of the path.

Quiz 3 Let $\mathbf{F}(x, y)=\left\langle\frac{-y}{x^{2}+y^{2}}, \frac{x}{x^{2}+y^{2}}\right\rangle$. Find $\int_{C} \mathbf{F} \cdot d \mathbf{r}$ form $(1,0)$ to $(-1,0)$ for $C$ along the upper and lower halves of the circle $x^{2}+y^{2}=1$ and over straight lines through $(1,0),(1,1),(-1,1),(-1,0)$. Is $\mathbf{F}$ conservative? Is $\mathbf{F}$ irrotational ?

Quiz 4 Let $\mathbf{F}(x, y)=\left\langle 3 x^{2}-2 x y, 2 y^{2}-2 x y\right\rangle$. Verify the Green's theorem for the region bounded by $y=x$ and $y=x^{2}$.

Quiz 5 Use double integrals and change of variable to find the value of $\int_{0}^{\infty} e^{-x^{2}} d x$.
Quiz 6 Consider the vector field $\mathbf{F}(x, y, z)=\left\langle x^{2} y, y^{2} z, z^{2} x\right\rangle$. Let $C$ be the curve of intersection of the surfaces $A_{1}: z=x^{2}+y^{2}$ and $A_{2}: z=2 x+3$. Verify the Stoke's theorem for the surface $A_{1} / A_{2}$ and also find the surface area of $A_{2} / A_{1}$.

Quiz 7 Consider the vector field $\mathbf{F}(x, y, z)=\left\langle x^{2} y, y^{2} z, z^{2} x\right\rangle$. Let $V$ be the volume bounded by the surfaces $z=x^{2}+y^{2}$ and $z=2 x+3$. Verify the Divergence theorem. Also find the volume of $V$.

Quiz 8 Is $\langle\mathbb{R}, \cdot,+\rangle$ a field? How to convert $\mathbb{R}^{2}=\{(x, y) \mid x, y \in \mathbb{R}\}$ to a field?
Quiz 9 Let $f=u+i v$ be dirrerentiable. Show that $u_{x}, u_{y}, v_{x}, v_{y}$ exists and satisfy the CR equations: $u_{x}=v_{y}, u_{y}=-v_{x}$. Also if $C$ is a loop in a simply connected region prove that $\oint_{C} f(z) d z=0$.

Quiz 10 Let $f(z)=\frac{z}{(z-1)^{2}(z-2)}$.
Find constants $a_{k}$ such that $f(z)=\sum_{k=-\infty}^{\infty} a_{k}(z-1)^{k}$.
Quiz 11 Find $\int_{0}^{\infty} \frac{1}{1+x^{4}} d x$
Quiz 12 Find $\mathcal{L}^{-1}\left\{\frac{s}{(s-1)^{2}(s-2)}\right\}$.
Quiz 13 Find the image of the lines $x, y=\cdots,-3,-1,1,3, \cdots$ under the function $f(z)=z^{2}$

