FINAL EXAM CALCULUS 2

(90 minutes)

1. Find the area of the parallelogram with vertices $A(0,0,0)$, $B(1,0,1)$, $C(2,1,3)$, and $D(0,-1,1)$.

2. Find the curvature of $\vec{r}(t) = (e^t cost, e^t sint, t^2)$ at the point $(1,0,0)$.

3. Evaluate $\displaystyle\iint_D (x+2y)dxdy$, where D is the domain bounded by $y=\sqrt{x}$ and $y=x^2$.

4. Evaluate $\displaystyle\iint_D xdxdy$, where D is the domain outside the circle $x^2+y^2=1$ and inside the circle $x^2+y^2=2x$.

5. Find the volume of the solid E enclosed by the planes $z=0$ and $z=x+2y+3$ and by the cylinders $x^2+y^2=4$ and $x^2+y^2=9$.

6. Evaluate $\displaystyle\int_C xy^2 ds$, where C is the curve given by $x=2\sin t$, $y=t$, $z=-2\cos t$, $0 \le t \le \pi$.

7. Using Green's Theorem to evaluate $\displaystyle\int_C (e^x + x^2 y)dx + (e^y - xy^2)dy$, where C is the boundary of the region between the circles $x^2+y^2=2y$.

8. Determine whether or not $\vec{F}$ is a conservative vector field? If it is, find a function f such that $\vec{F} = \nabla f$, where

$$\vec{F}(x,y,z) = e^y \vec{i} + xe^y \vec{j} + (z+1)e^z \vec{k}.$$

9. Evaluate $\displaystyle\iint_S zdS$, where S is the surface with parametric equations $x=u^2$, $y=u\sin v$, $z=u\cos v$, $0\le u\le 1$, $0\le v\le \pi/2$.

10. Using Divergence Theorem to calculate the surface integral $\displaystyle\iint_S \vec{F}\cdot d\vec{S}$, where

$$\vec{F}(x,y,z) = (z+xy^2)\vec{i} + (y+xe^{-z})\vec{j} + (\cos y + x^2 z)\vec{k},$$

and S is the surface of the solid bounded by paraboloid $z=x^2+y^2$ and plane $z=9$.