Math 223 Exam#3

Name _____

I.D. # _____

1. (12 pts) Let D be the region inside the circle $x^2 + y^2 = 1$. Decide whether each integral is positive, negative, or zero.

(a) $\int_D \sin x\, dA$ (b) $\int_D \sin(x^2) dA$ (c) $\int_D xy\, dA$ (d) $\int_D e^{-y^2} dA$

2. (10 pts) Evaluate the integral $\int_R (2x^2 y + 3) dA$, where R is the region bounded by $y = x$ and $y = x^2$.

3. (8 pts) Reverse the order of the integration of the integral $\int_0^1 \int_{\sqrt{y}}^1 e^{x^3} dx dy$

4. (6 pts) Evaluate the integral $\int_0^1 \int_{\sqrt{y}}^1 e^{x^3} dx dy$

5. (6 pts) Sketch the region over which the integral $\int_0^1 \int_{x^2}^{\sqrt{x}} f(x,y)\,dxdy$ is computed.

6. (4 pts) Sketch the region over which the integral $\int_0^{\pi/4} \int_0^5 f(r,\theta)\,rdr\,d\theta$ is computed.

7. (8 pts) Evaluate $\int_R (x^2+y^2)^{1/2}\,dA$, where R is the upper half of the ring bounded by $x^2+y^2=9$ and $x^2+y^2=4$.

8. (8 pts) Convert the integral $\int_{-2}^{2} \int_0^{\sqrt{4-x^2}} cos(x^2+y^2)dydx$ to polar coordinates and evaluate.

9. (6 pts) Write a parameterization of the circle of radius 5 centered at the origin traced clockwise starting from $(0,5)$ when $t=0$.

10. (6 pts) Write a parameterization of the line through the points $(1, -1, 2)$ and $(-1, 0, 3)$.

11. (6 pts) Find the acceleration vectors for the motion $\begin{cases} x = t^3 + 2t - 3 \\ y = t^2 - 2t + 3 \\ z = t + 4 \end{cases}$

12. (8 pts) Find the length of the curve $\begin{cases} x = 1 - t \\ y = 2 + t \\ z = 3 - t \end{cases}$ for $0 \leq t \leq 4$.

13. (6 pts) Find a normal vector of the plane $\begin{cases} x = 4 + s - 2t \\ y = 5 - s \\ z = 6 + t \end{cases}$

14. (6 pts) Are the line $\begin{cases} x = 5 - 2t \\ y = 7 + 2t \\ z = 9 + 4t \end{cases}$ and the plane $x - y - 2z = 99$ perpendicular, parallel, or neither?