Name_____ ID_____

MATH 251 Quiz 6 Spring 2006

Sections 506 P. Yasskin

1	/ 5
2	/10
2	/10
Total	/30

1. (5 points) Which of the following integrals will give the volume of the donut given in spherical coordinates by $\rho = \sin\varphi$.

a. $\int_0^{\pi}\int_0^{2\pi}\int_0^{\sin\varphi} \rho^2\cos\varphi\, d\rho\, d\varphi\, d\theta$

b. $\int_0^{\pi}\int_0^{2\pi}\int_0^{1} \sin\varphi\, d\rho\, d\varphi\, d\theta$

c. $\int_0^{2\pi}\int_0^{\pi}\int_0^{\sin\varphi} \rho^2\sin\varphi\, d\rho\, d\varphi\, d\theta$

d. $\int_0^{2\pi}\int_0^{\pi}\int_0^{1} \sin\varphi\,\rho^2\cos\varphi\, d\rho\, d\varphi\, d\theta$

e. $\int_0^{\pi}\int_0^{2\pi}\int_0^{\sin\varphi} 1\, d\rho\, d\varphi\, d\theta$

2. (10 points) Find the average temperature $T_{\text{ave}} = \dfrac{\iiint T\,dV}{\iiint dV}$ inside the region between the paraboloid $z = x^2 + y^2$ and the plane $z = 4$ if the temperature is given by $T = x^2z + y^2z$.

3. (10 points) Compute $\int\int (y-x)\,dx\,dy$ over the region bounded by the lines $y = x - 1$, $y = x + 2$, $y = 1 - x$, and $y = 2 - x$.

Use curvilinear coordinates.
Half credit for rectangular coordinates.