Math 250B X01
Test Three

Time: 50 minutes
Total: 20 marks

Name: _____

1. [4 marks] Use a triple integral in spherical coordinates to set up the volume of the solid region inside $z = 2\sqrt{x^2 + y^2}$, inside $x^2 + y^2 + z^2 = 16$, and above $z = 2$. Do not evaluate the integral.

2. [5 marks] Find the work done by the force field $\mathbf{F} = [2xy,\ 3y^2]$ in moving a particle over the line segment from $(-1, 0)$ to $(5, 7)$.

3. [5 marks] Use a change of variables to evaluate $I = \iint\limits_R \frac{(2x+y)^3}{2+3x-y} dA$ where R is bounded by $2x + y = 2,\ 2x + y = 3,\ 3x - y = 0$ and $3x - y = 1$.

4. [6 marks] Find the surface area of the following parametric surface:
$\mathbf{r} = [3\sin a\cos b,\ 3\sin a\sin b,\ 3\cos a]$ where $0 \leq a \leq \pi$, $0 \leq b \leq 2\pi$.