Name: ID #: Section #:

Q1) [**3pts**] Use Lagrange Multipliers to find maximum and minimum values of $f(x, y, z) = 3x - y - 3z$ subject to the constraints $x + y - z = 0$ and $x^2 + 2z^2 = 1$.

Q2) [**4pts**] Calculate the iterated integrals

(a) $\displaystyle\int_1^3 \int_0^1 (1+4xy)\, dxdy =$

(b) $\displaystyle\int_0^4 \int_{\sqrt{x}}^2 \frac{1}{y^3+1}\, dydx$ [Reverse the order of the integration]

Q3) [**3pts**] Find the volume of the solid bounded by the cylinder $x^2 + y^2 = 1$ and the planes $y = z$, $x = 0$, $z = 0$ in the first octant.

Name: ID #: Section #:

Q1) [**3pts**] Use Lagrange Multipliers to find maximum and minimum values of $f(x, y, z) = x + 2y$ subject to the constraints $x + y + z = 1$ and $y^2 + z^2 = 4$.

Q2) [**4pts**] Calculate the iterated integrals

(a) $\int_0^2 \int_0^\pi r \sin^2 \theta \, d\theta dr =$

(b) $\int_0^4 \int_{\sqrt{x}}^2 \frac{1}{y^3 + 1} \, dy dx$ [Reverse the order of the integration]

Q3) [**3pts**] Find the volume of the solid that lies under the paraboloid $z = 3x^2 + y^2$ and above the region bounded by $y = x$ and $x = y^2 - y$.