Name: ID #: Section #:

1) [**3pts**] Let $u = \sqrt{r^2 + s^2}$, $r = y + x\cos t$, $s = x + y\sin t$.

Find $\dfrac{\partial u}{\partial x}$ at $x = 1,\ y = 2,\ t = 0$.

2) [**3pts**] Find an equation of the tangent plane to the surface $x^2 - 2y^2 + z^2 + yz = 2$ at $(2, 1, -1)$.

3) [**4pts**] Find local maximum and minimum values and saddle points of $f(x, y) = x^3 - 12xy + 8y^3$.

Name: ID #: Section #:

1) [**3pts**] Find $\dfrac{dz}{dt}$ if $z = \tan^{-1}(y/x),\ x = e^t,\ y = 1 - e^{-t}$.

2) [**3pts**] Find the directional derivative of $f(x, y, z) = xe^y + ye^z + ze^x$ at $(0, 0, 0)$ in the direction of the vector $\vec{v} = \langle 5, 1, -2 \rangle$.

3) [**4pts**] Find local maximum and minimum values and saddle points of $f(x, y) = x^3 - 12xy + 8y^3$.