Assessment Solution: CS6380

1. Given the function $f(x, y) = x^2$, what is:

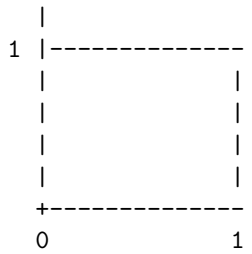
a. $\frac{\partial f}{\partial x} = 2x$

b. $\frac{\partial f}{\partial y} = 0$

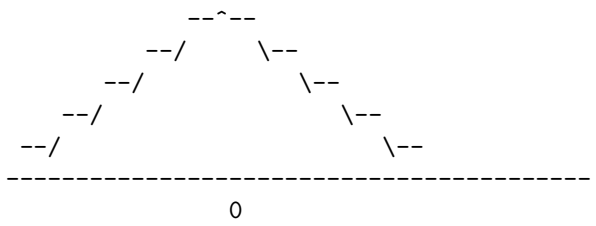
c. ∇f (the gradient of f)= $[2x, 0]^T$:

d. $\nabla f(2, 3) = [4, 0]^T$

2. Plot the uniform distribution over $[0, 1]$.



3. Plot the $\mathcal{N}(0, 1)$ normal distribution.



4. Give pseudo-code to compute the Riemann integral of a function f over the interval $[a, b]$ where there are n partitions.

```
function v = Riemann(f,a,b,n)
%
v = 0;
x = [a:1/n:b];
del_x = x(2) - x(1);
for k = 1:length(x)
  v = v + f(x(k))*del_x;
end
```

5. Given a function *rand* which uniformly samples the interval $[0, 1]$, provide pseudo-code to compute a Monte Carlo estimate of the integral of a function f over the interval $[a, b]$ where there are n samples.

```
function v = MC(f,a,b,n)
%
v = 0;
for k = 1:n
  v = v + f(a + rand*(b-a));
end
v = v/n;
```

6. Given the equation $F = ma$, where F is the graviational constant, g in the negative y direction, give the discrete approximation equations which describe the velocity at time t, and the y position at time t for a falling object. [Hint: a is $\frac{dv}{dt}$; discretize v^t to get one equation; do similarly to get equation for y.]

```
a = dv/dt ==> (v^(t+1)-v^{t})/del_t = g
  ==> v^{t+1} = v^{t} + g*del_t
v = dy/dt ==> (y^(t+1)-y^{t})/del_t = v
  ==> y^{t+1} = y^{t} + v*del_t
```

7. Give the truth table for the logical OR operator.

A	B	A V B
0	0	0
0	1	1
1	0	1
1	1	1

8. Give a truth table proof for Modus Ponens:

```
  1. A
  2. A -> B
 ------------
     B
```

A	B	(A ^ (A -> B)) -> B
0	0	0 0 1
0	1	0 0 1
1	0	1 0 1 0 0 1
1	1	1 1 1 1 1 1 1

Cheating Policy: I understand the academic cheating policy of the course (signature):

Signature: _____

Motivation: Explain why you are interested in taking the Multiagent Systems class, what particular areas are of most interest, and what you hope to get out of the course.