Test-2-version A

No work = No credit!

1. Find

   a) $\lim\limits_{(x,y)\to(0,0)} \dfrac{xy^4}{x^2+y^8}$;

   b) $\lim\limits_{(x,y)\to(0,0)} \dfrac{\sin(x^2+y^2)}{x^2+y^2}$. (6+9=15 pt) $\boxed{\text{Hint for b), polar coordinates and L'Hospital's rule}}$

2. $f(x,y,z) = e^x \sin(yz)$, find f_x, f_{xy}, f_{xyz}. (3+3+4=10 pt)

3. Consider surface $xy^2z^3 = 8$, find its tangent plane at point $(2,2,1)$. (10 pt)

4. Find $P(x_0, y_0)$ at which the fastest rate of change of the function $f(x,y) = x^2 + y^2 - 2x - 4y$ is 10 and its direction is parallel to $\rangle 3, 4 \langle$. (10+10=20 pt)

5. Find all local maximum ,minimum and saddle points of $f(x,y) = 4 - 3xy + x^3 + y^3$. (20 pt)

6. Find the absolute maximum and minimum of

$$f(x,y) = e^{-xy}$$

   in the region $D = \{(x,y) | x^2 + 4y^2 \le 8\}$. (20 pt)

   $\boxed{\text{Hint: } e^{-xy} > 0\text{, which means if } xe^{-xy} = 0 \text{ then } x = 0.}$

7. a) Compute $\iint_D 6xy^2 \, dA$, where D is the triangle with the triangular region with vertices $(0,0)$, $(1,1)$, and $(1,-1)$; b) Compute $\int_0^1 \int_x^1 \cos(y^2) \, dydx$. (7+8=15pt)

Test-2-version B

No work = No credit!

1. Find

   a) $\displaystyle\lim_{(x,y)\to(0,0)} \frac{x^4y}{x^8+y^2}$;

   b) $\displaystyle\lim_{(x,y)\to(0,0)} \frac{\tan(x^2+y^2)}{x^2+y^2}$. (6+9=15 pt) $\boxed{\text{Hint for b), polar coordinates and L'Hospital's rule}}$

2. $f(x,y,z) = e^x\cos(yz)$, find f_x, f_{xy}, f_{xyz}. (3+3+4=10 pt)

3. Consider surface $x^3y^2z = 8$, find its tangent plane at point $(1,2,2)$. (10 pt)

4. Find $P(x_0,y_0)$ at which the fastest rate of change of the function $f(x,y) = x^2+y^2-4x-2y$ is 10 and its direction is parallel to $\rangle 4,3\langle$. (10+10=20 pt)

5. Find all local maximum, minimum and saddle points of $f(x,y) = 4-3xy+x^3+y^3$. (20 pt)

6. Find the absolute maximum and minimum of

   $$f(x,y) = e^{-xy}$$

   in the region $D = \{(x,y)|4x^2+y^2 \le 8\}$. (20 pt)
   $\boxed{\text{Hint: } e^{-xy} > 0, \text{ which means if } xe^{-xy} = 0 \text{ then } x = 0.}$

7. a) Compute $\displaystyle\iint_D 6x^2y\,dA$, where D is the triangle with the triangular region with vertices $(0,0)$, $(1,1)$, and $(-1,1)$; b) Compute $\displaystyle\int_0^1\int_x^1 \sin(y^2)\,dydx$. (7+8=15pt)