HOMEWORK ASSIGNMENT 2

Name: **Due:** Wednesday September 11 (before recitation)

Note: Homework must be submitted online on Canvas (scanned).

Problem 1:

Find the limit or show that it does not exist:

1. $\lim\limits_{(x,y)\to(0,0)} \dfrac{3x^2 - y^2 + 5}{x^2 + y^2 + 2}$
2. $\lim\limits_{P\to(\pi,\pi,0)} (\sin^2 x + \cos^2 y + \sec^2 z)$
3. $\lim\limits_{(x,y)\to(0,0)} x\sqrt{1 - \cos\left(\dfrac{x}{y}\right)}$
4. $\lim\limits_{(x,y)\to(0,0)} \dfrac{4 - 4\cos\sqrt{|xy|}}{|xy|}$, knowing that $2|xy| - \frac{x^2y^2}{6} < 4 - 4\cos\sqrt{|xy|} < 2|xy|$

Problem 2:

Find the limit or show that it does not exist:

1. $f(x,y) = -\dfrac{x}{\sqrt{x^2+y^2}}$
2. $f(x,y) = \dfrac{xy}{|xy|}$

Problem 3:

Show that the following function is continuous at the origin:

$$f(x,y) = \begin{cases} \dfrac{x^3 - xy^2}{x^2+y^2}, & (x,y) \neq (0,0), \\ 0, & (x,y) = (0,0). \end{cases}$$

Problem 4:

Find the partial derivative of the function with respect to each variable:

$$W(P,V,\delta,v,g) = PV + \frac{V\delta v^2}{2g}.$$

Problem 5:

Verify that $f_{xy} = f_{yx}$ for $f(x, y) = \ln(xy^2)$.

Problem 6:

Let $f(x, y) = x^2 + y^3$. Find the slope of the line tangent to this surface at the point $(-1, 1)$ and lying in

a) the plane $x = -1$,

b) the plane $y = 1$.

Problem 7:

Read Sections 14.4 and 14.5 of *Thomas' Calculus Early Transcendentals* book. We will go over these sections on Tuesday 10 and Thursday 12.