Math 21C
Test 2

Printed Name _____
(FIRST) (LAST)

Signature _____

Please Show All Your Work, and Mark Your Answers Clearly.

No Calculators -- No Scratch Paper -- No Cell Phones

There are **4 pages** of problems. (The last problem is for extra credit.)

You are expected to do your own work, and to adhere to the UCD Code of Academic Conduct.

Simplify all numerical answers, except in #6.

Please indicate clearly if you continue work on the back of a page.

If you finish the test during the last 10 minutes, please remain seated until the test papers have been collected from your row.

Be sure to stop working **immediately** when time is called; you are subject to a deduction from your test score if you do not.

① LET $\vec{u} = \langle 4, 8, 1 \rangle$ AND $\vec{v} = \langle 2, 1, 2 \rangle$.

A) FIND THE COSINE OF THE ANGLE BETWEEN $\vec{u}$ AND $\vec{v}$.

5 PTS

B) FIND $\text{PROJ}_{\vec{v}} \vec{u}$.

5 PTS

④ FIND THE INTERVAL OF CONVERGENCE FOR THE POWER SERIES $\sum_{n=0}^{\infty} \frac{(x+2)^n}{(n+4)3^n}$.
(WRITE YOUR ANSWER USING INTERVAL NOTATION.)

10 PTS

③ FIND AN EQUATION OF THE PLANE WHICH PASSES THROUGH THE POINTS
$P(1,1,2)$, $Q(2,5,4)$, AND $R(5,6,5)$. (SIMPLIFY YOUR ANSWER.)

9 PTS

④ FIND $\lim_{(x,y)\to(0,0)} \frac{8xy}{x^2+y^2}$, OR SHOW THAT THIS LIMIT DOES NOT EXIST.

6 PTS

⑤ FIND THE DISTANCE FROM THE POINT $P(8,5,11)$ TO THE PLANE $2x-6y-3z=23$.

7 PTS

⑥ APPROXIMATE $\int_0^{.6} x^3 e^{-x^5}\,dx$ USING THE FIRST 4 NONZERO TERMS OF A MACLAURIN SERIES, AND FIND AN UPPER BOUND FOR THE ABSOLUTE VALUE OF THE ERROR. (YOU DO NOT HAVE TO SIMPLIFY NUMERICALLY.)

12 PTS

(7) FIND THE POINT WHERE THE LINE THROUGH $P(2,7,1)$ AND $Q(5,3,-1)$ INTERSECTS THE PLANE $2X + 3Y - Z = 44$.

8 PTS

(8) APPROXIMATE $\sqrt{1.04}$ USING THE FIRST 4 TERMS OF THE MACLAURIN SERIES FOR $f(x) = \sqrt{1+x}$, AND SIMPLIFY EACH TERM IN YOUR APPROXIMATION. (YOU DO NOT HAVE TO COMBINE THE TERMS, OR ESTIMATE THE ERROR.)

9 PTS

(9) FIND THE DISTANCE FROM THE POINT $P(9,8,3)$ TO THE LINE WHICH PASSES THROUGH THE POINTS $Q(3,3,1)$ AND $R(4,5,-1)$.

9 PTS

(10) FIND THE FIRST 4 TERMS OF THE TAYLOR SERIES FOR

$$f(x) = \frac{1}{(3x-1)^2}$$ AT $a = 1$, AND SIMPLIFY THE COEFFICIENTS.

12 PTS

(11) FIND THE FIRST 4 NONZERO TERMS OF THE MACLAURIN SERIES FOR $f(x) = e^{3x}\cos x$. (SIMPLIFY THE COEFFICIENTS.)

8 PTS

(12) FIND THE SUM OF THE CONVERGENT SERIES $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n^2}{3^{n-2}}$ USING A POWER SERIES.

10 PTS (EXTRA CREDIT)