# Exam #3

This is a preview of the published version of the quiz

Started: Jun 7 at 11:18pm

# Quiz Instructions

Exam #3

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The following is Exam #3. You will have until Wednesday, June 1st at 11:59 pm to complete this exam. Please complete this exam on separate paper or on a tablet. Clearly indicate the question number for each question. Please show all work and clearly indicate your answers. Remember, this exam is an opportunity for you to demonstrate what you know. It is acceptable to use your notes. I understand that there may be discussions, which I am not opposed to. Just please do not simply give away answers. Also, please do not use any online resources or websites to request others to do questions for you. It is fine for you to visit my office hours or send me an email to ask me questions.

For this exam, do not click on "Submit". Once you do, you will not be able to access the exam again. You can simply close your web browser when you are finished working for the moment.

When you are ready to submit your exam, you will not submit the exam to this assignment. You will submit your exam through the "**Exam #3 Submission Assignment**" in Canvas under **Assignments**.. This assignment can be found under the Assignments menu option to your left. You can use a device to scan your exam.

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(7 points) 1. Find three positive numbers whose sum is 200 and whose product is a maximum.

(7 points) 2. Use Lagrange multipliers to determine the maximum and minimum values of $f(x, y) = xy$ subject to the constraint $g(x, y) = 4x^2 + y^2 = 8$.

(6 points) 3. Estimate $\int\int_R (3xy^2 + 2x^2)\, dA$ where $R = [0,1] \times [0,1]$ by dividing *R* into four equal squares and evaluating the function at the upper right corner of each square.

(7 points) 4. Find the volume under the surface $z = 1 + x^2y^2$ and above the region in the xy-plane enclosed by the parabola $x = y^2$ and the line $x = 4$.

(7 points) 5. Find the average value of the function $f(x,y) = 4x^2y^2$ over the region bounded by the lines $x = 3$ and $y = 2$ in the first quadrant.

(7 points) 6. Use a double integral to find the volume of the solid region under the paraboloid $z = x^2 + y^2$ and above the disk $x^2 + y^2 \leq 16$.

(7 points) 7. Sketch the region of integration, reverse the limits of integration, and then integrate: $\int_0^2 \int_{y/2}^1 y\cos(x^3 - 1)\, dx\, dy$

(7 points) 8. Use a double integral to find the area inside one leaf of $r = 3\sin 2\theta$.

(7 points) 9. Use a triple integral to find the volume of the tetrahedron enclosed by the coordinate planes and the plane $4x + 2y + z = 8$.

(7 points) 10. Use cylindrical coordinates to evaluate $\int\int\int_E (x + y + z)\, dV$ where E is the solid enclosed by the paraboloid $z = 4 - x^2 - y^2$ and the $xy$-plane.

(7 points) 11. Given $f(x, y) = 6x^2 - 2x^3 + 3y^2 + 6xy$. Determine any local maxima, local minima, and saddle points.

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