How to Upload Homework

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$dx \quad x$

$$\int \frac{dy}{\sqrt{y+1}} = \int \frac{dx}{\sqrt{x}}$$

$u = y+1$

$du = dy$

$$\int \frac{1}{\sqrt{u}}\,du$$

$$\int u^{-\frac{1}{2}}\,du$$

$$2\sqrt{u} + C_1 = \int x^{-\frac{1}{2}}\,dx$$

$$2\sqrt{y+1} + C_1 = 2\sqrt{x} + C_2$$

$$2\sqrt{y+1} = 2\sqrt{x} + C \quad \text{where } C = C_2 - C_1$$

$$\sqrt{y+1} = \sqrt{x} + \frac{1}{2}C$$

$y + 1 = (\sqrt{x} + \frac{1}{2}C)^2$

$C^2 + 4C - 12 = 0$

$(C+6)(C-2) = 0$

$C = -6$ ✓ $C = 2$ ✓

$$y = (\sqrt{x} - 3)^2 - 1$$

or

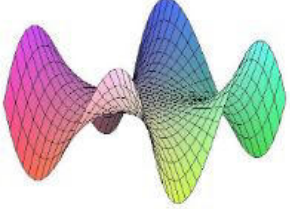
$$y = (\sqrt{x} + 1)^2 - 1$$

Elliott Jacobs

Only C = 2. See comment below

Elliott Jacobs

18/20 Please note that if y(1) = 3, then this equation already implies that C = 2



MA 243

- Syllabus
- Welcome to Calculus III
- Homework problems
- How to upload your homework
- How to use Camscanner
- Office hours

Modules

1. Module 1 - Surfaces and vectors
2. Module 2 - Partial derivatives and double integrals
3. Module 3 - Double and triple integrals
4. Module 4 - Max-min problems

Syllabus

Assignments

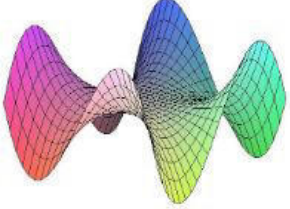
Grades

People

Pages

Modules

EagleVision Zoom



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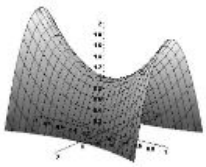
Details

Spheres and other surfaces



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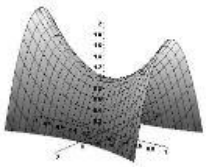

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Assignment 1. *Spheres and Other Surfaces*

Read 12.1 and 12.6
You should be able to do the following problems:
Section 12.1/Problems 51 - 64 Section 12.6/Problems 1 - 44
Hand in the following problems:

1. The following equation describes a sphere. Find the radius and the coordinates of the center.

$$x^2 + y^2 + z^2 = 2(x + y + z) + 1$$

2. A particular sphere with center $(-3, 2, 2)$ is tangent to both the xy-plane and the xz-plane. It intersects the xy-plane at the point $(-3, 2, 0)$. Find the equation of this sphere.

3. Suppose $(0, 0, 0)$ and $(0, 0, -4)$ are the endpoints of the diameter of a sphere. Find the equation of this sphere.

4. Find the equation of the sphere centered around $(0, 0, 4)$ if the sphere passes through the origin.

Sketch each of the following surfaces

5. $$z = \sqrt{1 - x^2 - y^2}$$

6. $$z = 4 - 2x - y^2$$

7. $$z = 1 - y^2$$

8. $$z = 4 - x - y$$

9. $$z = 4 - x^2 - y^2$$

10. $$x^2 + z^2 = 16$$

MA 243 Calculus III Assignment 1: *Spheres and Other Surfaces*

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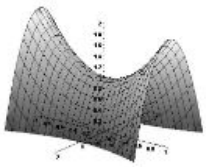

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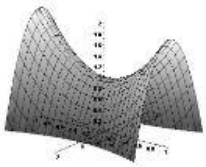

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$\partial u = \langle 1, 0, -1 \rangle$

$\partial v = \langle 0, 1, -1 \rangle$

$\partial u \times \partial v = \begin{vmatrix} i & j & k \\ 1 & 0 & -1 \\ 0 & 1 & -1 \end{vmatrix}$

$i(0+1) - j(-1-0) + k(1-0)$

$= (1, 1, 1)$

$\int_0^1 \int_0^1 \langle u, v, 1-u-v \rangle \cdot \langle 1, 1, 1 \rangle$

$[u]_0^1 \cdot [v]_0^1 = 1$

(4) $\langle x, y, z \rangle = \langle u\cos v, u \sin v, u^2 \rangle$

where $\frac{1}{2} \le u \le 1$ & $0 \le v \le 2\pi$

$\begin{vmatrix} \cos v & \sin v & 0 \\ -u\sin v & u\cos v & 2u \end{vmatrix}$ $2u\sin v - 2u\cos v + u\cos v \, u \sin v$

$\sqrt{(2u\sin v)^2 + (-2u\cos v)^2 + u^2}$

$\sqrt{5u^2} = \sqrt{5}\,u$

$\int_0^{2\pi} \int_0^1 \sqrt{5}\,u \Rightarrow \frac{\sqrt{5}}{2}(2\pi - 0) = \sqrt{5}\pi$

Audrey Buehler

15/20 Dot product is where the terms are all added together, the correct term to integrate is sqrt(3)!

Audrey Buehler

15/20 The correct term inside of the integral is usqrt(1+4u^2)!