

University of Delaware
Department of Mathematical Sciences

MATH-243 – Analytical Geometry and Calculus C

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Spring 2012

Homework 1

Name: _____ **Section:** _____

Due date: February 9, 2012 (Section 50)
February 8, 2012 (Section 51)

Problems

Taken or adapted from Section 12.1 of the book *Calculus: Early Transcendentals* 7th edition by J. Stewart. Each exercise is worth 10 points for a total of 100 points.

1. Exercise # 2. Sketch the points $(0, 5, 2)$, $(4, 0, -1)$, $(2, 4, 6)$, and $(1, -1, 2)$ on a single set of coordinate axes.
2. Exercise # 8. Find the lengths of the sides of the triangle PQR defined by points $P(2, -1, 0)$, $Q(4, 1, 1)$, $R(4, -5, 4)$. Is it a right triangle? Is it an isosceles triangle?
3. Exercise # 15. Show that the equation $x^2 + y^2 + z^2 - 2x - 4y + 8z = 15$ represents a sphere. Find its center and radius.
4. Exercises # 26, 31, 32, and 34. Describe in words and sketch the region in \mathbb{R}^3 represented by the following equations or inequalities: (a) $x \geq -3$, (b) $x^2 + y^2 + z^2 \leq 3$, (c) $x = z$, and (d) $x^2 + y^2 + z^2 > 2z$.
5. Exercise # 38. Write inequalities to describe the following region: The solid upper hemisphere of the sphere of radius 2 centered at the origin.
6. Exercise # 40. Consider the points P such that the distance from P to $A(-1, 5, 3)$ is twice the distance from P to $B(6, 2, -2)$. Show that the set of all such points is a sphere, and find its center and radius.
7. Exercise # 41. Find an equation of the set of all points equidistant from the points $A(-1, 5, 3)$ and $B(6, 2, -2)$. Describe the set.