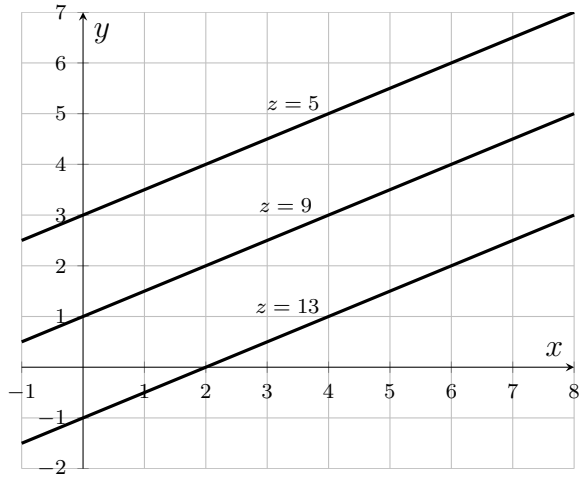
Name _____

Homework 2
Sections 12.4 & 12.3

1. (4) Determine an equation of the plane which passes through the points $(2, -1, -4)$, $\left(5, 3, \frac{55}{2}\right)$, and $(2, 3, 20)$

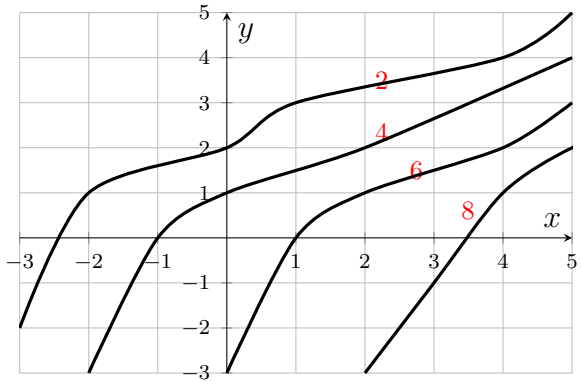
2. (5) The contour diagram below shows three level curves of the linear function $g(x, y)$. Find a formula for the function $g(x, y)$.



3. (5) Sketch a contour diagram for $f(x, y) = x - y^2 + 3$ with at least four labeled contours.

4. (3) Is there a *function of two variables* whose $z = 0$ level set consists exactly of the circles $x^2 + y^2 = 5$ and $x^2 + y^2 = 16$? If so, what is an example of such a function? If not, why not?

5. (3) The contour diagram of the function $f(x, y)$ is shown below.



(a) At the point corresponding to $(2, 1)$ is the function increasing or decreasing with respect to x?

(b) At the point corresponding to $(4, 2)$ is the function increasing or decreasing with respect to y?

(c) Suppose a bug is walking along the graph of $f(x, y)$. If the bug walks in a straight line from the point corresponding to $(1, 3)$ to the point corresponding to $(4, 1)$, is the bug walking uphill or downhill?