WebAssign
Hw 9 (14.1): Functions of Several Variables (Homework)

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MA 261 Fall 2012, section 121, Fall 2012
Instructor: David Daniels

Current Score : 20 / 20 **Due :** Tuesday, September 11 2012 11:00 PM EDT

1. 2.5/2.5 points | Previous Answers SCalcET7 14.1.007.

The wave heights h in the open sea depend on the speed v of the wind and the length of time t that the wind has been blowing at that speed. Values of the function $h = f(v, t)$ are recorded in feet in the table below.

TABLE 4

Duration (hours)

Wind speed (knots) v \ t	5	10	15	20	30	40	50
10	2	2	2	2	2	2	2
15	4	4	5	5	5	5	5
20	5	7	8	8	9	9	9
30	9	13	16	17	18	19	19
40	14	21	25	28	31	33	33
50	19	29	36	40	45	48	50
60	24	37	47	54	62	67	69

(a) What is the value of $f(30, 20)$? What is its meaning?

According to the table, $f(30, 20)$ = 17 ✓ , which means that if a 30-knot wind has been blowing in the open sea for 20 hours, it will create waves with estimated heights of 17 ✓ feet.

(b) What is the meaning of the function of $h = f(50, t)$? Describe the behavior of this function.

- ○ We fix v and t, resulting in a constant value.
- ◉ We fix $v = 50$ and allow t to vary, resulting in an equation of one variable.
- ○ We fix $t = 50$ and allow v to vary, resulting in an equation of one variable.
- ○ We allow v and t to vary, resulting in a function of two variables.

✓

(c) What is the meaning of the function $h = f(v, 50)$? Describe the behavior of this function.

- ○ We fix v and t, resulting in a constant value.
- ○ We fix $v = 50$ and allow t to vary, resulting in an equation of one variable.
- ◉ We fix $t = 50$ and allow v to vary, resulting in an equation of one variable.
- ○ We allow v and t to vary, resulting in a function of two variables.

✓

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2. 2.5/2.5 points | Previous Answers SCalcET7 14.1.009.

Let $g(x, y) = \cos(x + 3y)$.

(a) Evaluate $g(6, -2)$.

$g(6, -2) =$ 1 ✓

(b) Find the domain of g.

- $-1 \le x \le 1, \frac{1}{3} - \le y \le \frac{1}{3} -$
- $\mathbb{R}^2$ ✓
- $-1 \le x + 3y \le 1$
- $\frac{\pi}{2} - \le x + 3y \le \frac{\pi}{2} -$
- $-3 \le x \le 3, -1 \le y \le 1$

(c) Find the range of g. (Enter your answer using interval notation.)

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✓

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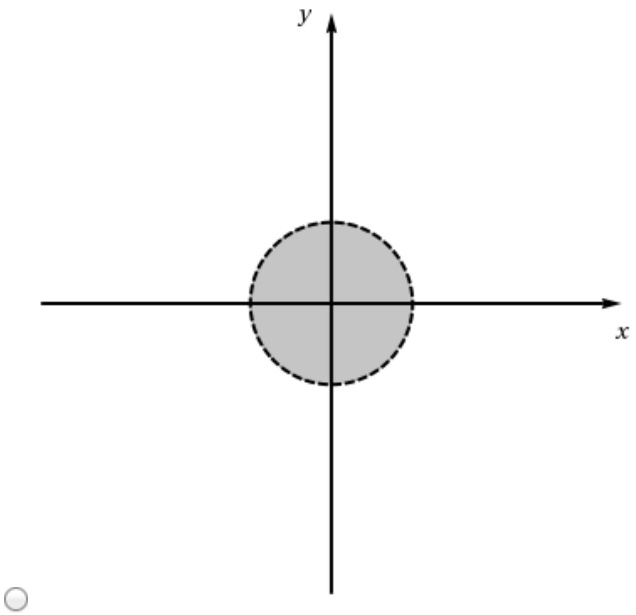
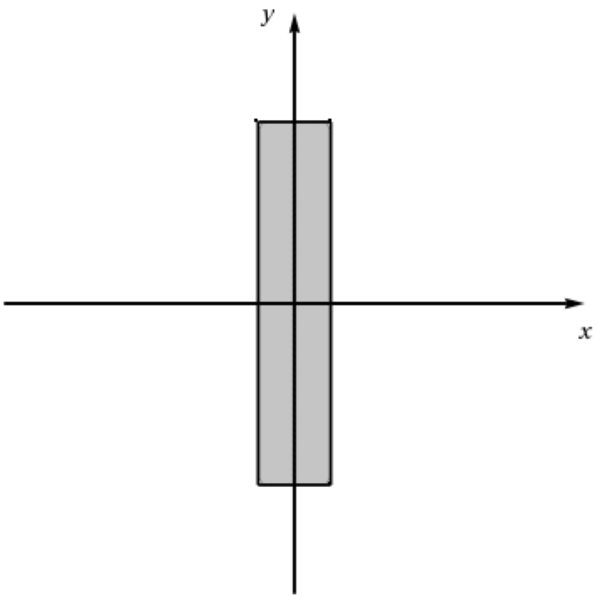
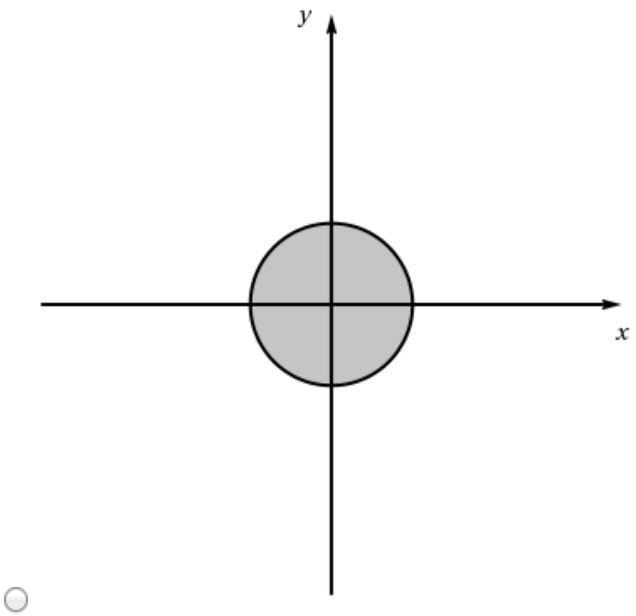
3. 2.5/2.5 points | Previous Answers SCalcET7 14.1.017.

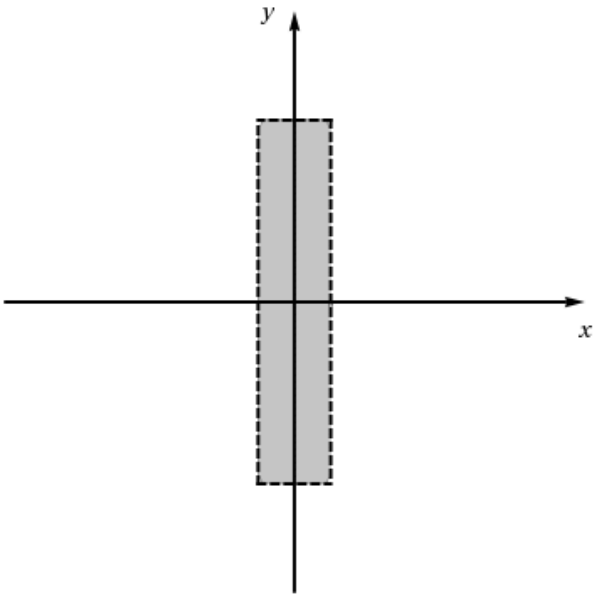
Find and sketch the domain of the function.

$f(x, y) = \sqrt{1 - x^2} - \sqrt{25 - y^2}$









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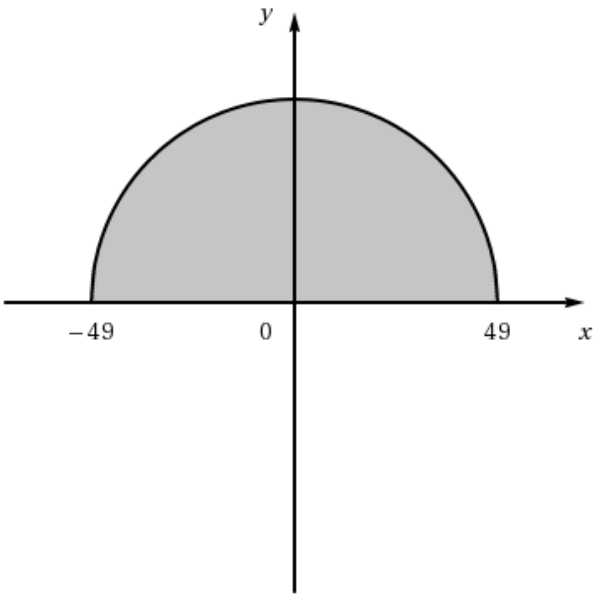
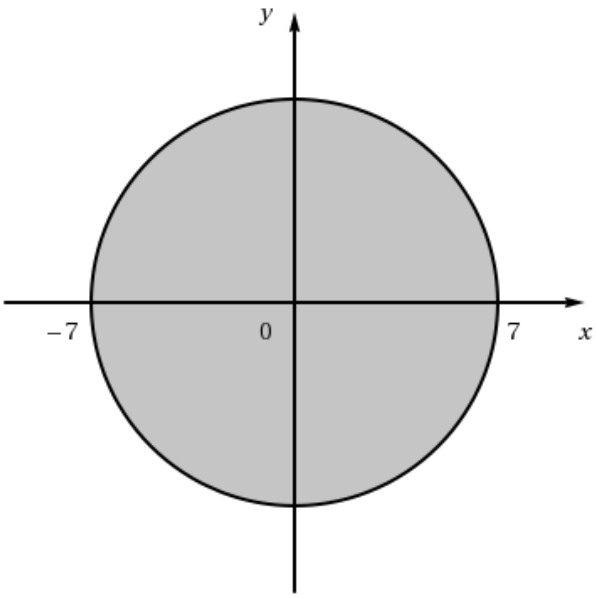
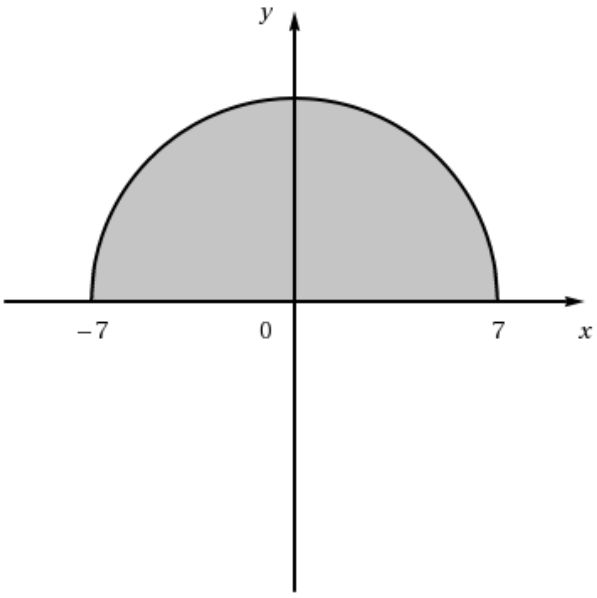
4. 2.5/2.5 points | Previous Answers SCalcET7 14.1.018.

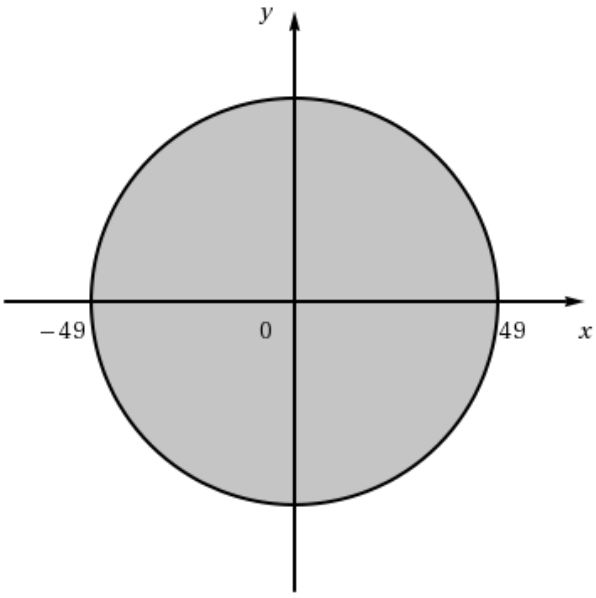
Find and sketch the domain of the function.

$f(x, y) = \sqrt{y} + \sqrt{49 - x^2 - y^2}$









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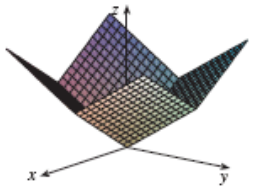
5. 2.5/2.5 points | Previous Answers SCalcET7 14.1.032.

Match the function with its graph.

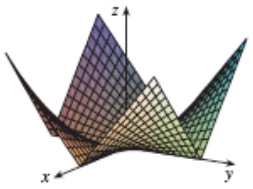
D ✓ $f(x, y) = \left(x^2 - y^2\right)^2$

A.



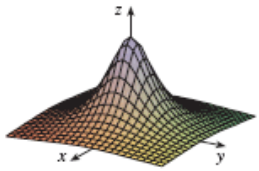
A ✓ $f(x, y) = |x| + |y|$

B.



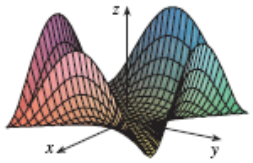
B ✓ $f(x, y) = |xy|$

C.



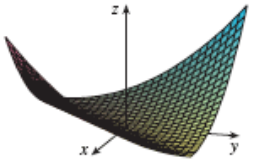
E ✓ $f(x, y) = (x - y)^2$

D.



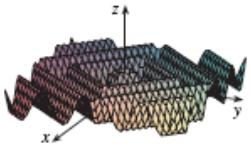
C ✓ $f(x, y) = \dfrac{1}{1 + x^2 + y^2}$

E.



F ✓ $f(x, y) = \sin(|x| + |y|)$

F.



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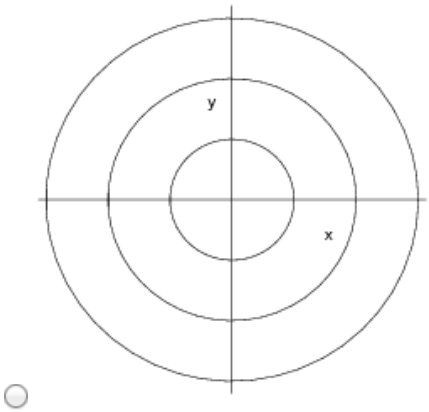
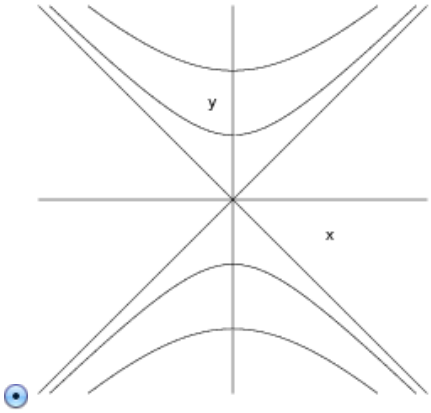
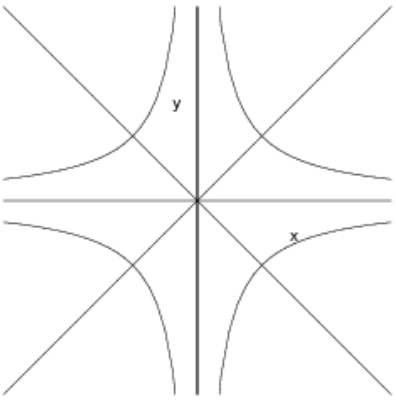
6. 2.5/2.5 points | Previous Answers SCalcET7 14.1.049.

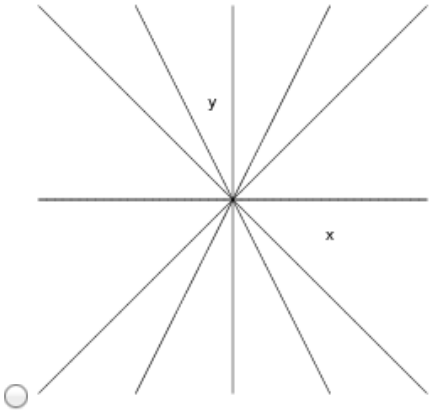
Draw a contour map of the function showing several level curves.

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









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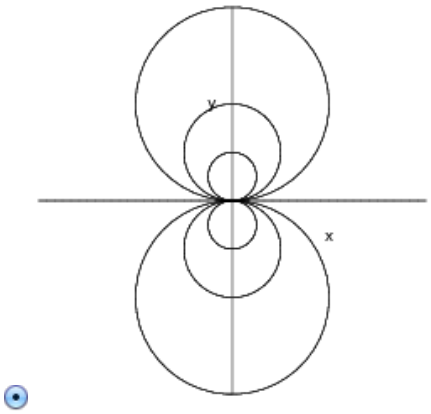
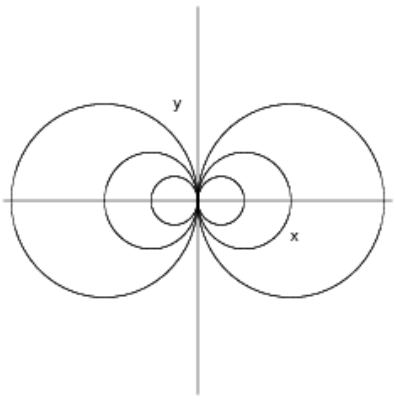
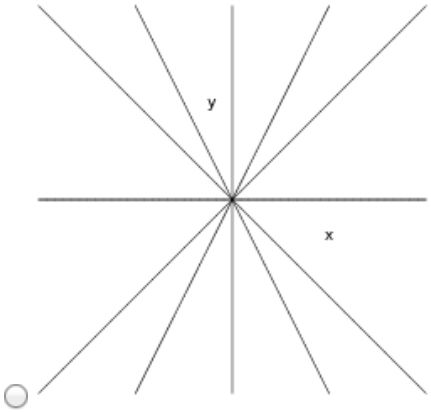
7. 2.5/2.5 points | Previous Answers SCalcET7 14.1.050.

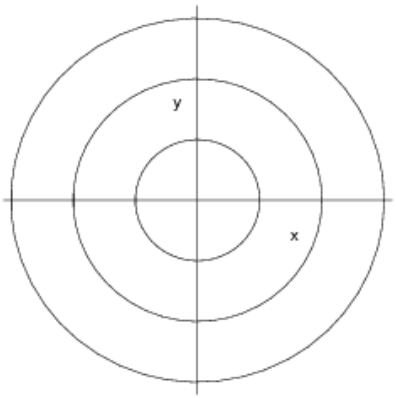
Draw a contour map of the function showing several level curves.

$f(x, y) = y/(x^2 + y^2) - 1$









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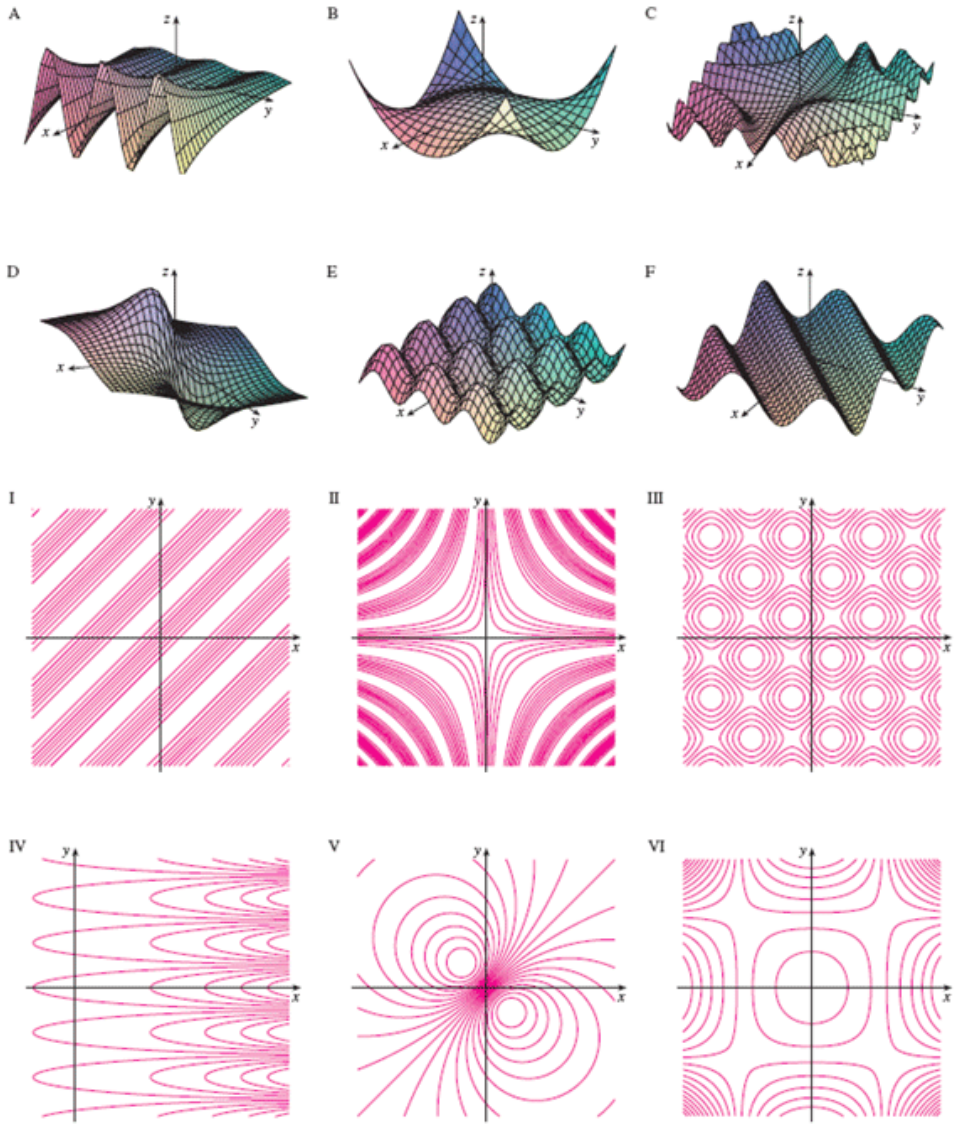
8. 2.5/2.5 points | Previous Answers SCalcET7 14.1.061.

Consider the function below.

$z = \sin(x - y)$



(a) Match the function with its graph (labeled A-F).

- A
- B
- C
- D
- E
- F ✔

(b) Match the function with its contour map (labeled I-VI).

- (•) I
- ( ) II
- ( ) III
- ( ) IV
- ( ) V
- ( ) VI

Give reasons for your choices.

This function is periodic in both x and y but is constant along the lines $y = x + k$, a condition satisfied only by F and I .

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