Math 141 **version A** Name: _____
April 21, 2011 Class: 1:40 2:50 (circle one)

Test 1

100 points

You may use a calculator, but **no** notes, homework, or books allowed. **Show your work**, where possible, for full credit. Circle or box your answers if needed to make them clear.

1. [5 pts each] Find the domain of the following functions. Answers must be exact and use correct notation.

a. $f(x)=\sqrt{5-2x}$

b. $g(x)=\dfrac{x+1}{x^2-8x+15}$

Domain: _____

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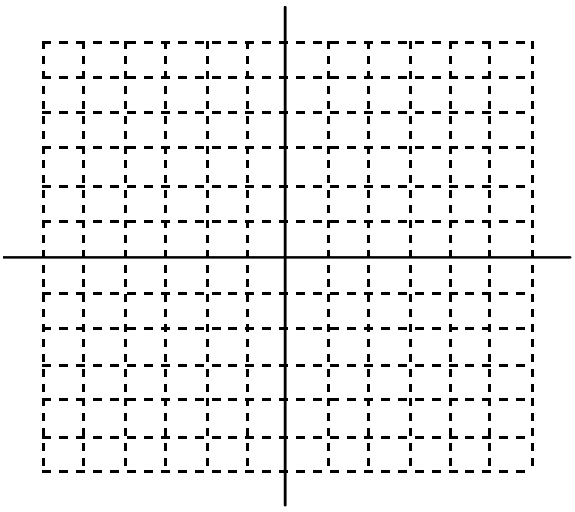
2. For the piecewise-defined function $f(x)=\begin{cases} x^2 & \text{if } x\le 1 \\ 3x-1 & \text{if } x>1 \end{cases}$,

a. Find the following: [4 pts]

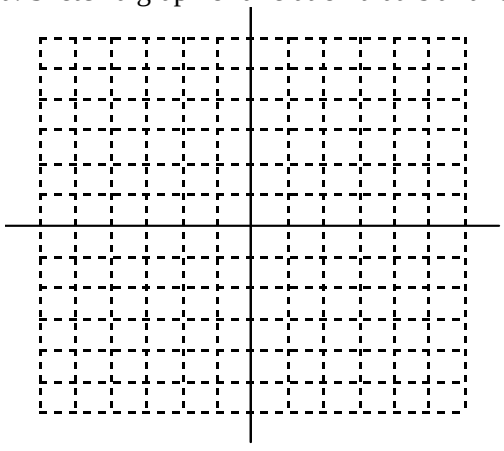
$f(-2)=$_____ $f(0)=$_____ $f(1)=$_____ $f(2)=$_____

b. Sketch the graph of $f(x)$ [6 pts]

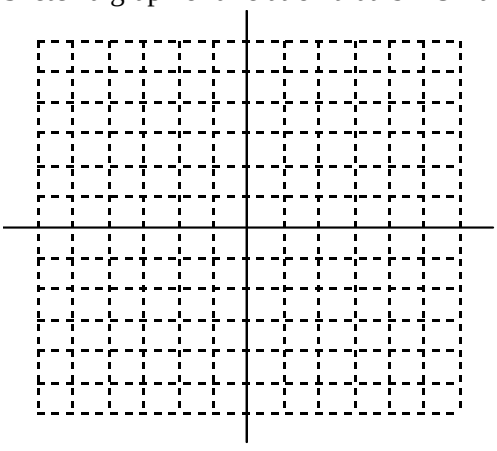


3. [3 pts each]

a. Sketch a graph of a relation that is a function.



b. Sketch a graph of a relation that is NOT a function.



4. [4 pts each] If $f(x) = x^2 - 5x + 2$, find and simplify

a. $f(-2)$

b. $f(3a)$

c. $\dfrac{f(a+h) - f(a)}{h}$

5. [6 pts] Determine algebraically if $f(x) = 2x^2 + x$ is even, odd, or neither. Show work.

6. [5 pts each] Given $f(x) = x^2 - 5x$, find the average rate of change (and simplify)

a. between $x = -3$ and $x = -1$

b. between $x = -3$ and $x = -3+h$

7. [6 pts] Solve the equation $x^2 - 5x - 3 = 0$ by completing the square. Leave answers in exact (not decimal) form.

8. [5 pts each] Find all real solutions for *x* using **any** method. Show work neatly and leave answers in exact form. If there are no real solutions, state "no real solutions."

a. $\frac{9}{x} - \frac{12}{x-5} + 2 = 0$

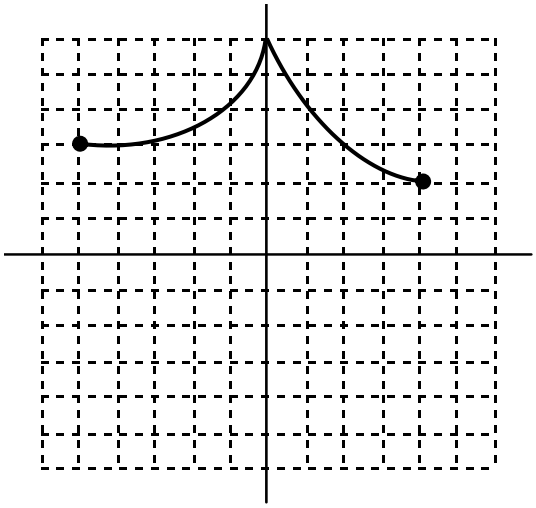
b. $x^4 + x^2 - 12 = 0$

9. [4 points] If given the graph of $f(x)$, choose the description below that best describes how the graph of $y = -3f(x)$ can be obtained from the graph of $f(x)$.

a. By shrinking vertically by a factor of 3 and then reflecting the result across the *y*-axis
b. By stretching vertically by a factor of 3 and then reflecting the result across the *y*-axis
c. By shrinking vertically by a factor of 3 and then reflecting the result across the *x*-axis
d. By stretching vertically by a factor of 3 and then reflecting the result across the *x*-axis
e. By reflecting in the *x*-axis and then shifting the result 3 units down.

Answer: _____

10. [12 pts] Use the graph of *f* given to the right to answer the following questions.



a. Is the relation a function? _____

b. Find the interval(s) where *f* increases _____

c. Find *f*(2). _____

d. Find the domain. _____

e. Find the range. _____

f. Sketch a graph of $y = f(x-2)-1$ on the same axes

11. [4 points] Write an equation for a function $f(x)$ that has the shape of $y = \sqrt{x}$, but shifted up 3 units and reflected across the *y*-axis (horizontally).

Answer:_____

12. [10 points] A stone is thrown straight upward at an initial speed of 32 ft/s. It's height (in feet) above the ground after *t* seconds is given by $h = -16t^2 + v_0 t$.

a. When does the stone reach a height of 12 feet?

b. What is the greatest height reached by the stone?

c. When does the stone reach the highest point of its path?

d. When does the stone hit the ground?