Math 141 Exam 2 Name_____
10/20/17 [/50]

Show all your work for full credit. Unsupported answers = 0 points. Please use a pencil and write legibly.

1. Find the domain for the following functions. When necessary, use a sign-diagram. Write answers in interval notation.

a) $f(x) = \frac{3x-5}{x-4}$

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b) $g(x) = (10 + 3x)^{-1/2}$

[/2]

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3) If $f(x) = x^2 - 1$ and $g(x) = 4\sqrt{x-3}$, simplify the following and state the domain.

a) $(f \circ g)(x)$

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b) $(g \circ f)(x)$

[/2]

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c) $(f \circ f)(x)$

[/2]

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2. Given $f(x) = \frac{2x}{x+1}$, find the average rate of change between $x_1 = 3$ and $x_2 = 3 + h$.

[/3]

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3. State the toolkit function $f(x)$ and describe all the transformation performed on $f(x)$ to obtain $g(x)$.

a) $g(x) = -2(x+4)^3$

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b) $g(x) = \sqrt{5-x} + 3$

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c) $g(x) = [\![\frac{3}{2}x - 6]\!] - 2$

[/3]

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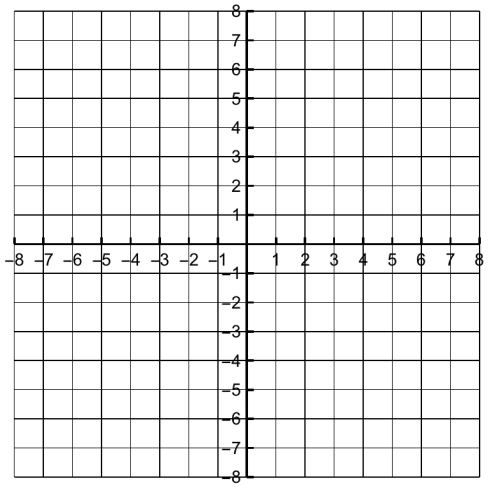
4. Make a sketch of the piecewise function: $f(x) = \begin{cases} (x-1)^2 - 3 & \text{if } x \le 3 \\ -2x + 9 & \text{if } x > 3 \end{cases}$



[/4]

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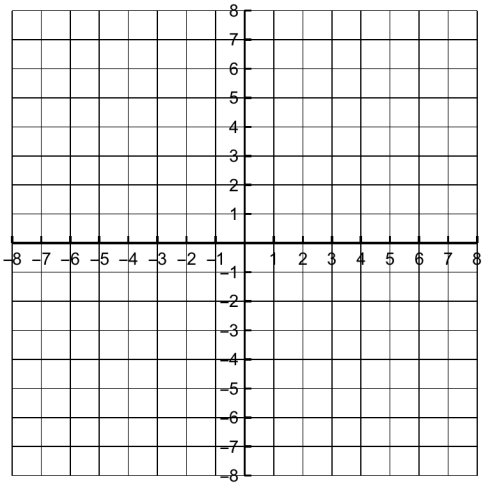
5. Write the quadratic in vertex form, and make a sketch of the parabola labeling the vertex, line of symmetry, and any x and y intercepts.

$P(x) = \frac{-1}{2} x^2 + 4x - 6$



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6. Find the dimensions of the rectangle with greatest **perimeter** bounded by the x-axis and the function $f(x) = 8 - x^2$.

[/5]

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7. An orchard has 86 apple trees and each tree produces on average 1200 apples. The farmer wants to increase his yield by planting more trees, but for every tree planted the number of apples per tree decreases by 10. Find the number of additional trees that should be planted to yield the greatest number of apples, and find the total number of apples expected. Show your work.

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8. Given the function $g(x) = \sqrt{x+3} + 2$,
   a) Find the range and domain g.
   b) Find the inverse function $g^{-1}(x)$.
   c) Find the domain and range of g^{-1}.
   d) Graph both g and g^{-1} on the same coordinate system.

Domain of g_____[/1]

Range of g_____[/1]

$g^{-1}(x)$ =_____[/3]

Domain of g^{-1}_____[/1]

Range of g^{-1}_____[/1]

Graph[/3]