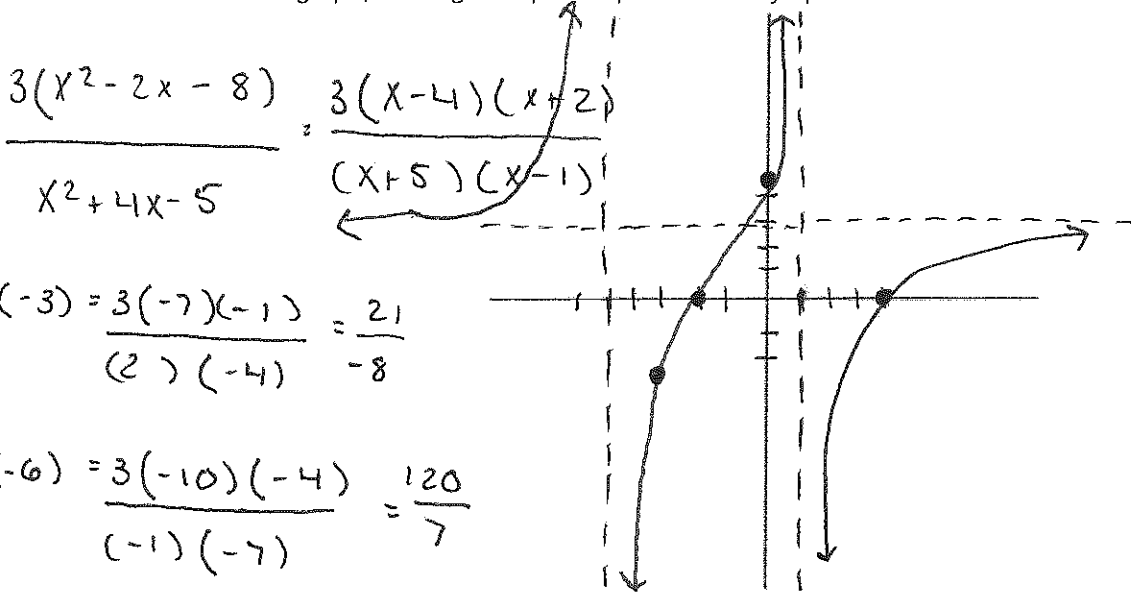


Key

Honors Pre-Calculus Sample Midterm w/ Rubric

Part 1: Given $f(x) = \frac{3x^2 - 6x - 24}{x^2 + 4x - 5}$, determine the following:

1. y-intercept: $= 24/5$ $(0, 24/5)$
2. x-intercepts: $(4, 0)$ $(-2, 0)$
3. Vertical Asymptotes: $x = -5$ $x = 1$
4. Horizontal or slant asymptotes. Explain what test you used to find them: $y = 3$
5. Are there any point discontinuities/holes? Explain: NO - nothing cancels
6. Sketch the graph, labeling all important points and asymptotes:



Question	1 point	2 points	3 points
1, 2, 3	Stated correctly w/o work, not shown on graph.	Found, with work shown, not shown correctly on graph.	Found, with work shown, and shown correctly on graph.
4	Does one of the following: Found, graphed, and explained correctly.	Does two of the following: Found, graphed, and explained correctly.	Found, graphed, and explained correctly.
5	Does one of the following: Correctly stated, explained, and graphed correctly.	Does two of the following: Correctly stated, explained, and graphed correctly.	Correctly stated, explained, and graphed correctly.
6	Graph does not match answers 1-5.	Graph matches, but is not neat, or missing features.	Graph is neat and includes all features.

$$\frac{3c^2 + 12c + 12 - 6c - 12 - 24}{c^2 + 4c + 4 + 4c + 8 - 5} = \frac{3c^2 + 6c - 24}{c^2 + 8c + 7}$$

Part 2: Use f from the front. Calculate $f(c+2)$, showing work. Reduce.

1 point - Attempted to input value, but made major algebraic error	2 points - Input $(c+2)$ correctly, possible minor algebraic errors. OR, correct with messy work.	3 points - Entirely correct, work shown neatly.
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$$\frac{3(c+2)^2 - 6(c+2) - 24}{(c+2)^2 + 4(c+2) - 5} = \frac{3(c^2 + 4c + 4) - 6c - 12 - 24}{(c^2 + 4c + 4) + 4c + 8 - 5}$$

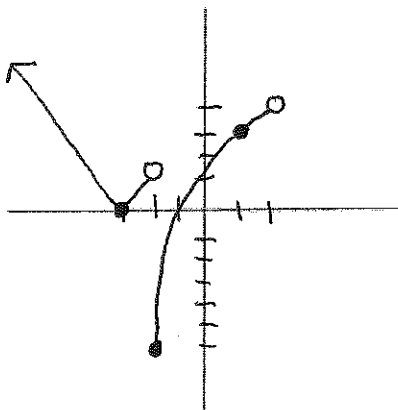
Part 3: Graph $f(x)$

$$y = \begin{cases} |x+3| & x < -2 \\ x+2 & 1 \leq x < 2 \\ -(x-1)^2 + 3 & -2 \leq x < 1 \end{cases}$$

$$-(-2-1)^2 + 3$$

$$-9 + 3 = -6$$

$$-(1-1)^2 + 3$$



1-2 points: Function shown overlapping, or graphed with major errors.	3-4 points: Function shown mostly correctly. Possible minor errors in shape. Possible errors in endpoints (switching between functions).	5 points: Entirely correct, graph is neat and readable. Shapes match the parent functions, and changes between functions are clearly shown.
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Part 4: Write a function with the following zeroes. You can leave it as a product of **real valued** factors, meaning you don't have to multiply the whole thing out, but no i 's.

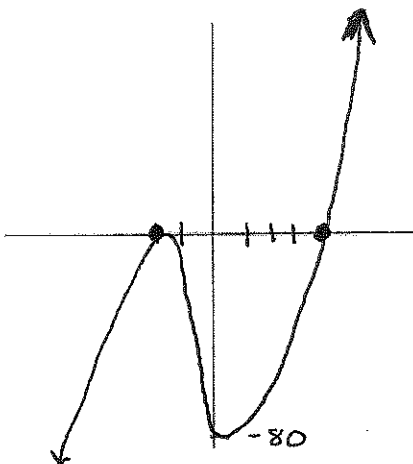
$-2, -2, 4, (2-i)$

$$(x+2)^2(x-4)(x^2-4x+5)$$

1-2 points: Written as the product of factors - real zeroes correct but complex zeroes not correct.	3-4 points: Includes both complex zeros. Zeros written correctly. Possible algebra errors, or no attempt to eliminate i	5 points: Entirely correct, with all zeros written as product of real valued polynomials.
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Part 5: Find the y-intercept of your function. (0-3 points, see front for scale) $(2)^2(-4)(5) = (-16)(5) = -80$

Part 6: Graph your function



$$(x+2)(x+2)(x-4)(x-(2-i))(x-(2+i))$$

$$(x^2+4x+4)(x-4)$$

$$x^2+4x^2+4x-4x^2-16x+16$$

$$(x-2+i)(x-2-i)$$

$$x^2-2x-xi-2x+4+2i+xi+i^2$$

$$(x^2-4x+5)$$

1-2 points: Graph includes zeros listed, but shape does not follow or fit expected behavior	3-4 points: Shape matches end behavior expected from degree. Multiplicity is correct.	5 points: Entirely correct, neat, appropriate scales, etc...
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