

You may not use a calculator for this test. Please answer all questions on the answer sheets provided, with questions 1, 2, and 3 on the graphing grids provided. You may keep this sheet.

Please note there are two pages.

[20] 1. Let $f(x) = \frac{(x+1)^2(3x-3)}{(x-2)^3}$

- (A) Find the y -intercept, if any.
 (B) Find the x -intercepts, if any.
 (C) Find the vertical asymptotes, if any.
 (D) Find the horizontal asymptotes, if any.
 (E) Using the information from (A)-(D), sketch the graph of $f(x)$.
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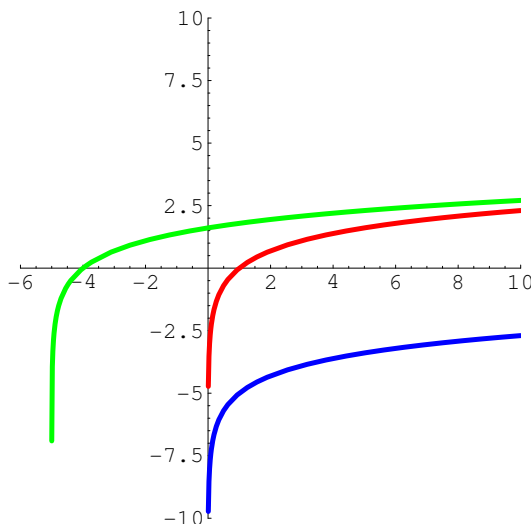
[10] 2. On the same set of axes, sketch and label the graph of:

$$f(x) = 2^x; \quad g(x) = 4^x; \quad h(x) = \left(\frac{1}{2}\right)^x; \quad i(x) = \left(\frac{1}{2}\right)^x - 1$$

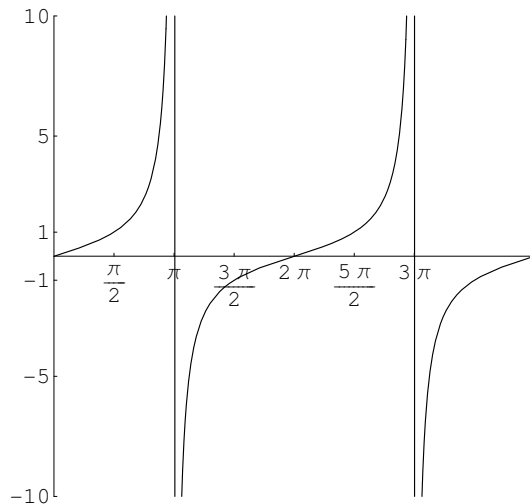
Your graphs don't have to be perfect, but you must label the asymptotes, if any, and make sure that your points for the small values are accurate on the grid.

[10] 3. Let $f(x) = 3 \cdot \sin\left(\frac{1}{2}(x+2)\right)$. (A) What are the period and amplitude of $f(x)$? (B) What phase shift is applied, if any? (C) Sketch the graph of both $f(x)$ and $y = \sin x$ on the same axes.

[10] 4. Below are the graphs of three functions: $f(x) = \ln(x)$, $g(x) = \ln(x-5)$, and $\ln(x) - 5$. On your answer sheet, name the color (red, green, or blue) that corresponds to each.



[10] 5. Below is the graph of the function $y = \tan(kx)$ for some constant k . Determine k .



[10] 6. Find all solutions to the exponential equation: $\frac{1}{8} = 2^{x^2-4x+1}$

[10] 7. Find all solutions to the logarithmic equation: $1 + \log_3(2 \cdot (x + 1)^2) = 3 \log_3(x + 1)$. Be sure to check your answers.

[10] 8. Find the following values:

(A) $\cot \frac{\pi}{3}$ (B) $\sec \frac{-3\pi}{2}$ (C) $\cos \frac{\pi}{3}$ (D) $\tan \frac{\pi}{6}$

[10] 9. Given that the terminal point of t is in Quadrant II and $\sec t = \frac{5}{3}$, find $\tan t$.
