Math 140
Test Three

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name (8 points)

This entertaining fifty-minute test covers sections 3.5 and 4.1–5 of Blitzer's *College Algebra: An Early Function Approach*. Clearly indicate your answers. Unless otherwise indicated, all parts of all problems are four points each.

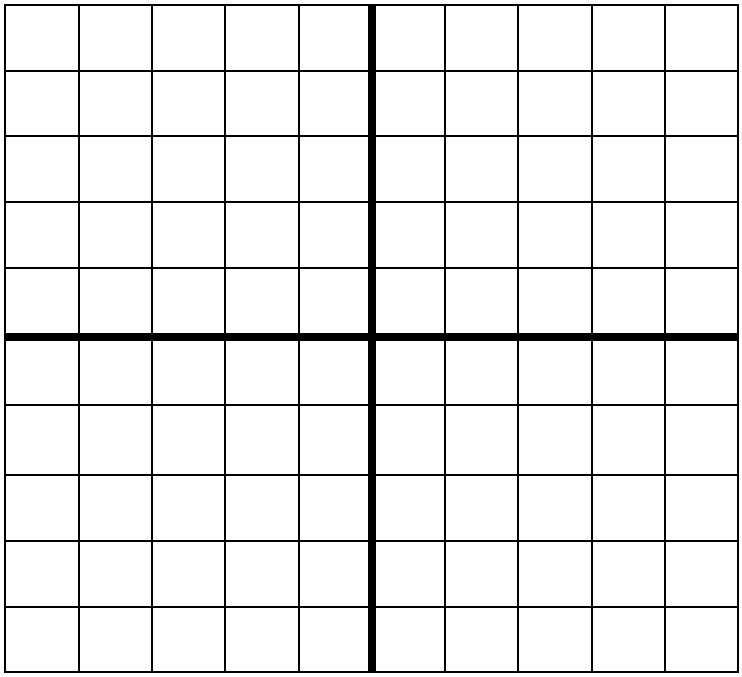
1. Let $f(x) = \frac{x-1}{x^2+x-6}$.

   a. What is the domain of $f(x)$? (2 points)

   b. List any vertical asymptotes. (3 points)

   c. List any horizontal or slant asymptotes. (3 points)

   d. Graph $y = f(x)$. Be sure to label any asymptote(s) and intercept(s), and at least one other point. (5 points)



2. Find the slant asymptote(s) (if any) of $f(x) = \frac{x^2+x-6}{x-1}$.

3. Approximate the following. (3 points each)

   a. $5^{\sqrt{3}}$

   b. $\log_2 8$

   c. $5^{\log_5(3)}$

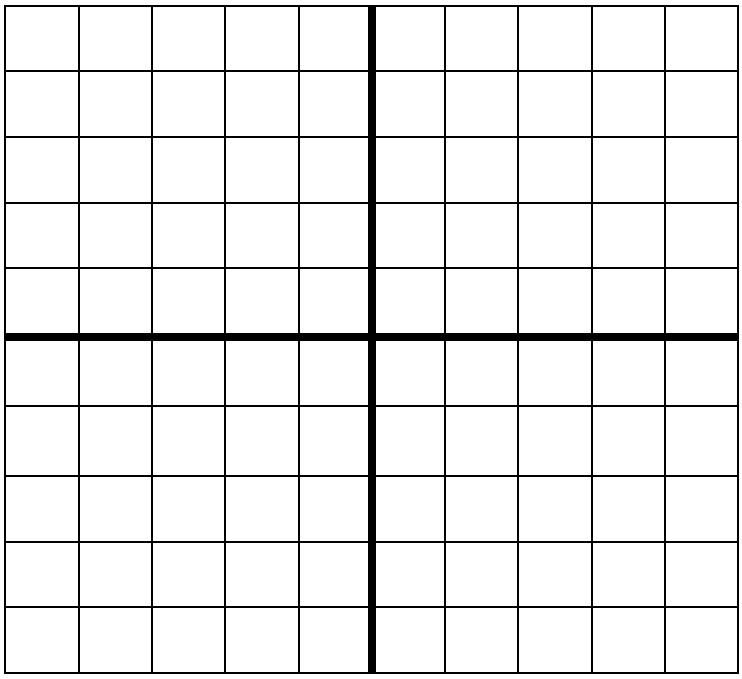
   d. $\log_2 7$

4. Let $g(x) = 2^{x+1}-1$.

   e. What is the domain of $f(x)$? (2 points)

   f. List any asymptotes (vertical, horizontal or slant). (3 points)

   g. Graph $y = g(x)$. Be sure to label any asymptote(s) and intercept(s), and at least one other point. (5 points)



5. Write $5 = \log_b 32$ in exponential form.

6. Write $4 = \sqrt[3]{64}$ in logarithmic form.

7. Evaluate $\log_3\left(\frac{1}{\sqrt[300]{3}}\right)$ without using a calculator.

8. Use the properties of logarithms to condense $\frac{1}{3}(\log_x x - \log_4 y)$ as much as possible.

9. Solve the following for x.

a) $\log_5(x+4) = 2$.

b) $e^{1-5x} = 140$

c) $\log_3(x-5) + \log_3(x+3) = 2$.

10. Use the properties of logarithms to expand the following as much as possible.

a) $\ln\left(\frac{x^3y}{z^2}\right)$

b) $\ln \sqrt[7]{x}$

11. The growth model $A = 4e^{0.008t}$ describes Old Zealand's population, A, in millions, *t* years after 2008.

a) What is Old Zealand's growth rate? (2 points)

b) What was its population in 2008? (2 points)

c) When will the population be 5 million?

d) How long will it take the population to double?

12. You decide to invest $8000, at an annual rate of 2%. How much will you have after three years if the interest is compounded continuously?