

## Spring 08 Algebra Evaluation

MTY Academy

Spring 08-Algebra

---

1. Find the domain of each of the following rational functions. Show your work in detail.

(1)  $f(x) = \frac{x^2 - 4}{2x^3 - x^2 - 15x}$

(2)  $f(x) = \frac{x^2 - 4}{2x^2 + x + 2}$

---

2. Let  $f(x) = 9 - \frac{1}{(x+4)^2}$ .

- (1) Find the domain of  $f(x)$ .
  - (2) Find the intercepts.
  - (3) Sketch the graph of  $f(x)$  by using transformations. Describe your transformations in words. **Label** all your graphs in order. **Indicate** any asymptotes and intercepts on your graph.
  - (4) Write any asymptotes as an equation.
  - (5) Find the range of  $f(x)$ .
- 

3. Let  $f(x) = \frac{x^2 - 4x}{2x^2 - 5x - 12}$

- (1) Find the domain.
  - (2) Find any vertical asymptote(s) and horizontal asymptote.
  - (3) Find y-intercept and x-intercept(s).
- 

4. Let  $f(x) = \frac{x-1}{x^2-9}$ .

- (1) Find the domain of  $f(x)$ .
  - (2) Find all intercept.
  - (3) Find the asymptotes, if any.
  - (4) Sketch the graph of  $f(x)$  by using the information obtained above, plus plugging at least two points.
- 

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

- (1) Find the domain of  $f(x)$ .

- (2) Find all intercept.
  - (3) Find any types of asymptotes, if any.
  - (4) Sketch the graph of  $f(x)$  by using the information obtained above, plus plugging at least two points.
- 

6. Solve each of the following inequalities, using the testing-point method (a sign-chart). Graph the solution set and write the solution set in interval notation.

- (1)  $\frac{-7}{x^2 + 4x - 12} < 1$
  - (2)  $\frac{x - 4}{x + 5} \leq \frac{1}{x - 3}$
  - (3)  $\frac{1}{x + 5} \geq \frac{1 - 2x}{x^2 + 2x - 15}$
  - (4)  $-1 \leq \frac{x + 4}{3 - x} \leq 3$
- 

7. Determine whether each of the following functions is one-to-one. Give reasons to support your answers.

- (1)  $f(x) = \frac{3}{|x| + 1}$
  - (2)  $f(x) = x^3 - 4x$
- 

8. Use the definition to prove each of the following functions is one-to-one.

- (1)  $f(x) = 2 - \sqrt{4 - 3x}$
  - (2)  $f(x) = x^3 + 2x$
- 

9. Let  $f(x) = \frac{3 - 2x}{x + 5}$ .

- (1) Find the inverse function  $f^{-1}$ .
  - (2) Identify the domain and range for BOTH functions.
- 

10. Let  $f(x) = 3^{x+4} - 5$ .

- (1) Find all intercept;
- (2) Find the horizontal asymptote;
- (3) Sketch the graph of  $f(x)$  using transformations. Indicate all information found above.
- (4) Find the domain and the range.

11. Let  $f(x) = -e^{x-2} - 3$ .
- (1) Find the y-intercept;
  - (2) Find the x-intercept;
  - (3) Sketch the graph by transformations. Describe the transformations in words.
  - (4) Find the horizontal asymptote;
  - (5) Find the range.
- 

12. Solve each of the following equations. Show your work in detail.

- (1)  $3^{x^2-4} = \left(\frac{1}{27}\right)^x$
  - (2)  $5 \cdot 2^x - 3 \cdot 2^x + 2 \cdot 2^x = 8$
  - (3)  $3^{2x-1} = 7$
  - (4)  $6 = 3^{2x-1}$
  - (5)  $4e^{3x} = 3^{x+1}$
  - (6)  $25^x - 2 \cdot 5^x = 8$
- 

13. Find the value of  $\log_{\frac{1}{2}} \sqrt[3]{16} =$  without using a calculator. Show your work.
- 

14. Rewrite  $\log_b \sqrt{\frac{x^3 y^4}{b x y^5}}$  as a sum or difference of simpler logarithms.
- 

15. Rewrite  $3 \ln x - \ln y - 4 \ln(2x) + \frac{1}{3} \ln(y - 1)$  as a single logarithm.
- 

16. Solve each of the following equations. Verify your answers. Box the solutions.

- (1)  $\log_x 25 = 2$
- (2)  $\log_2 x - \log_2(x - 1) = 1$
- (3)  $\log_2(x + 1) + \log_2(x - 2) = 2$
- (4)  $4(\log x)^2 + 5 \log x = 6$
- (5)  $4(\ln(2x - 1))^2 + 8 \ln(2x - 1) - 5 = 0$