

## **Exam**

NOTE: **Simplify** and **box** the final answer. Please show your work for each question so we may award partial credit if applicable. This exam is closed notes and calculators are not permitted.

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### **Question 1 (1 pt)**

Simplify the expression  $\sqrt{12} - 2\sqrt{3} + 3\sqrt{27}$ .

### **Question 2 (1 pt)**

Consider the rational function  $f(x) = \frac{2x^2+x-1}{x^2-3x+2}$ . Determine the vertical asymptote, horizontal asymptote, x-intercepts, and y-intercepts, if they exist. Find the slant asymptote if applicable.

## **Exam**

### **Question 3 (1 pt)**

Consider the rational function  $f(x) = \frac{x^2+3x-4}{x+2}$ . Determine the vertical asymptote, horizontal asymptote, x-intercepts, and y-intercepts, if they exist. Find the slant asymptote if applicable.

### **Question 4 (1 pt)**

Determine the end behavior as  $x$  approaches positive and negative infinity of the following function  $f(x) = -5x^5 + 2x^2 + 1$ . You can use limit notation if desired.

## **Exam**

### **Question 5 (2 pts)**

- a) Consider the exponential function  $g(x) = 3 \cdot 2^{x+1} - 4$ . Describe the transformations applied to the parent function to obtain the function. You do not need to sketch the graph.
- b) Consider the logarithmic function  $h(x) = \log_5(x) + 10$ . Describe the transformations applied to the function. You do not need to sketch the graph.

### **Question 6 (2 pts)**

- a) Solve the following exponential equation  $e^{2x+3} = 7$ .

### **Exam**

- b) Solve the following logarithmic equation  $2\log_3(x) = \log_3(9)$ .

### **Question 7 (1 pt)**

- a) Find the exact value of  $\sin(\frac{\pi}{4})$ . Explain what method you used or how you got the answer.

## **Exam**

### **Question 8 (1 pt)**

Two ships leave a harbor at the same time. Ship A sails due north for 200 miles, while Ship B sails 30 degrees east of north for 250 miles. What is the distance between the two ships?

### **Bonus Question ( 1 pt)**

Simplify the expression  $\frac{(\frac{2x^3}{y^2})^{-2}(\frac{x^2y}{3})^3}{(\frac{5xy}{4})^{-1}}$ .