MA 115 Exam 2 Name: ______________________

1. Find all vertical and horizontal asymptotes:

(a) $\dfrac{3}{x^2 - 7x + 12}$

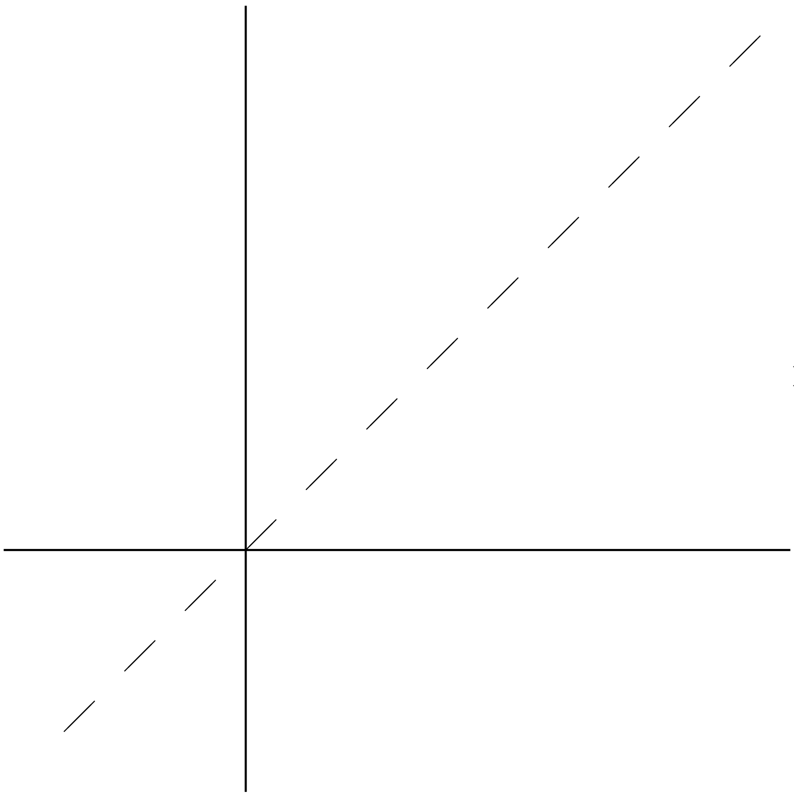
(b) $\dfrac{x^2 + 2x + 1}{4x^2 - 1}$

c. $\dfrac{x^2 + 1}{x}$

2. Completely factor the polynomial:

$$x^4 + 2x^3 - 7x^2 - 20x - 12$$

3. Graph the functions, $y = a^x$ and $y = \log_a x$ on the same graph. Label any intercepts and give the domain and range of both. (If intercepts don't exist, write DNE)



Details about each graph

	$y = a^x$	$y = \log_a x$
Domain:		
Range:		
Intercepts:		

4. Fill in the blank:

(a) $\ln(AB) =$

(b) $\ln(\frac{A}{B}) =$

(c) $\ln(e^x) =$

(d) $e^{\ln(x)} =$

5. Find the solution. Show all work. Give the exact value and round to 3 decimal places.

(a) $e^{5x} = 63$

(b) $6^{2x} = 45$

(c) $4e^{3-x} = 9$

(d) $3(7 + e^{2x}) = 46$

(e) $2 \log x = \log 3 + \log(6 - x)$

(f) $2 \log x = \log 2 + \log (5x - 12)$

6. Modeling. Answer the following:

(a) The number N of bacteria in a culture follows the exponential growth model, $N = Ae^{kt}$, where t is the time in hours. If the initial population, A, is 500 and 4 hours later N = 1400, when will N = 6500? Round final answer to two decimal places.

(b) The population p of a species of NMU's amazing mascot, the wildcat, t years after it is introduced into a new habitat is given by:

$$p = \frac{1800}{1 + 2e^{-t/5}}$$

1. Determine the population size that was introduced into the habitat.

2. After how many years will the population be 1400? Round answer to nearest two decimal places