1. Find all vertical and horizontal asymptotes:

   (a) $\dfrac{52}{x^2 - 5x + 6}$

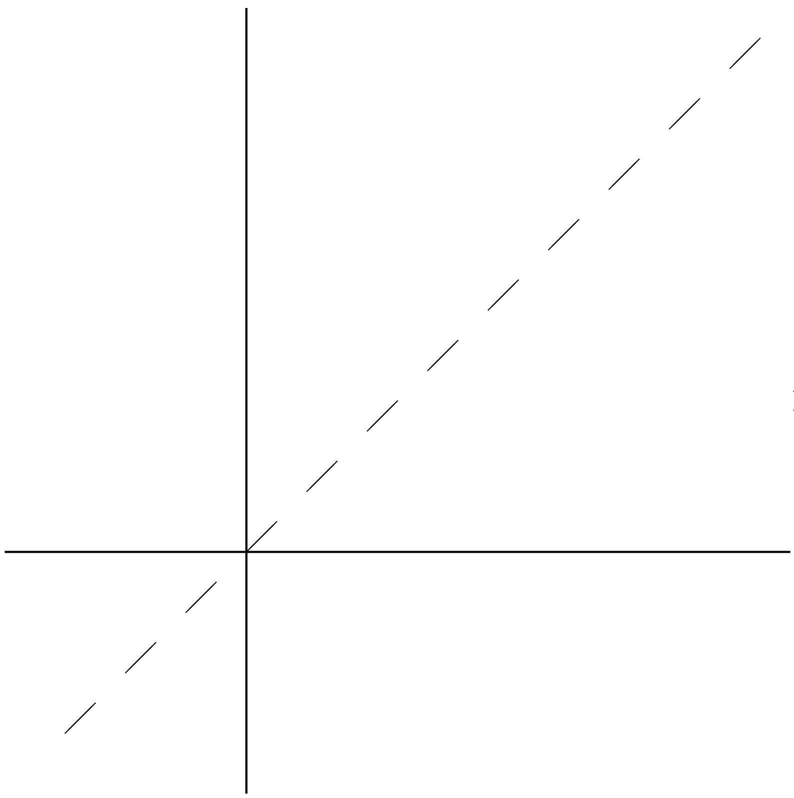
   (b) $\dfrac{x^2 - 2x - 3}{2x^2 - 5x - 3}$

   (c) $\dfrac{10 + x^3 - 7x^2}{x^3 + 11x^2 + 10x}$

2. Completely factor the polynomial:

$$x^4 + 9x^3 + 22x^2 - 32$$

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. (You should solve for the variable first, then grab a calculator)

(a) $e^{5x} = 15$

(b) $5^{3x} = 9$

(c) $3e^{4-x} = 8$

(d) $4(6 + e^{2x}) = 27$

(e) $2\log(x) = \log(3) + \log(\frac{11}{3}x + 4)$

(f) $\log_5 x + \log_5(x + 5) = \log_5 36$

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 is 400 and 3 hours later N = 1200, when will N = 2000?

(b) The population(p) of a mythical Badgermole, t years after it is introduced into a new habitat is given by:

$$p = \frac{4000}{1 + 3e^{-t/4}}$$

1. Determine the population size that was introduced into the habitat.
2. After how many years will the population be 2400?