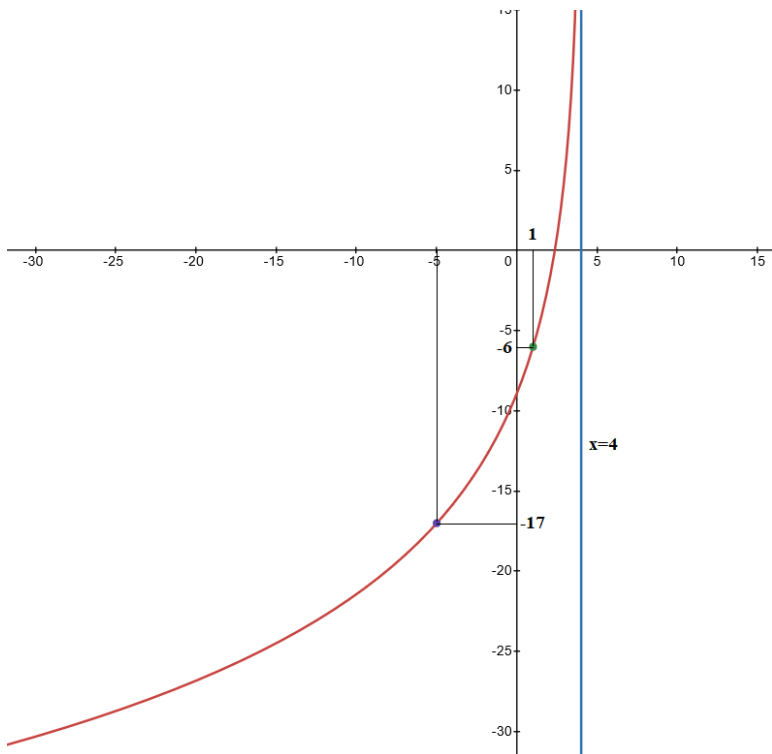


YOUR NAME: _____

George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. The figure shows the graph of a logarithmic function base 3. Find a possible formula for the graph on the right, explaining all steps involved.



2. Solve the following equations giving exact answers.

(a) $7 \ln(3x - 5) + 10 = 24$

(b) $\log_2(x + 1) - \log_2(10 - x) = 5$

3. Solve the equation giving an exact answer.

$$\frac{81^x}{27} = 9^{3x+5}.$$

4. Solve the equation giving an exact answer.

$$3^{5x-1} = 7^{x-3}.$$

5. This problem involves Newton's Law of Cooling

$$T(t) = Ae^{kt} + T_s.$$

A cup of chocolate is microwaved at 150° . At time $t = 0$, it is taken out and left to cool in a room with temperature 70° . Suppose that it takes 10 minutes for it to cool to 80° .

(a) Find an equation for $T(t)$ modeling the cooling process of the chocolate.

(b) If a guest prefers her chocolate at 100° , advise her how long to wait before indulging.