1. The height of a tide t hours after we start observing is given by $H(t) = 5 + Asin\left(\frac{\pi t}{12.5}\right)$, where H is in feet.

    a) (3 pts) If the maximum height of the tide is 23 feet, what is A?

    b) (6 pts) If we stay for 24 hours, how often do we see this maximum height and when do they occur?

2. a) (5 pts) Solve this system of equations algebraically. Show all steps.

$$\begin{cases} 5x + 6y = 7 \\ -x - 4y = 0 \end{cases}$$

b) (4 pts) Sketch a graph of the system in part a) labelling the scale and the point of intersection.

3. Consider the functions $f(x) = \sqrt{\ln(x)}$ and $g(x) = e^{x^2+1}$.

a) (3 pts) Solve $f(g(x)) = 2$ and $g(f(x)) = e^2$

b) (3 pts) For which values of a does the equation $f(g(x)) = a$ have exactly one solution?

c) (3 pts) Do the graphs of $f(g(x))$ and $\frac{g(f(x))}{e}$ intersect? Explain your answer.