Pop Quiz

Math 113-001/6 College Algebra
Colorado Mesa University Fall 2022

Name: _____

1. What are the coordinates of the vertex and of the two x-intercepts of the parabola that is the graph of $f(x) = -3 - 4x - x^2$?

2. According to the US Census Bureau, the population of the United States can be modelled by the function $p(t) = 165.6t^{1.345}$ where $p(t)$ is measured in thousands of people and t is measured in years since 1800.

   (a) According to this model, what was the population of the US in the year 1942?

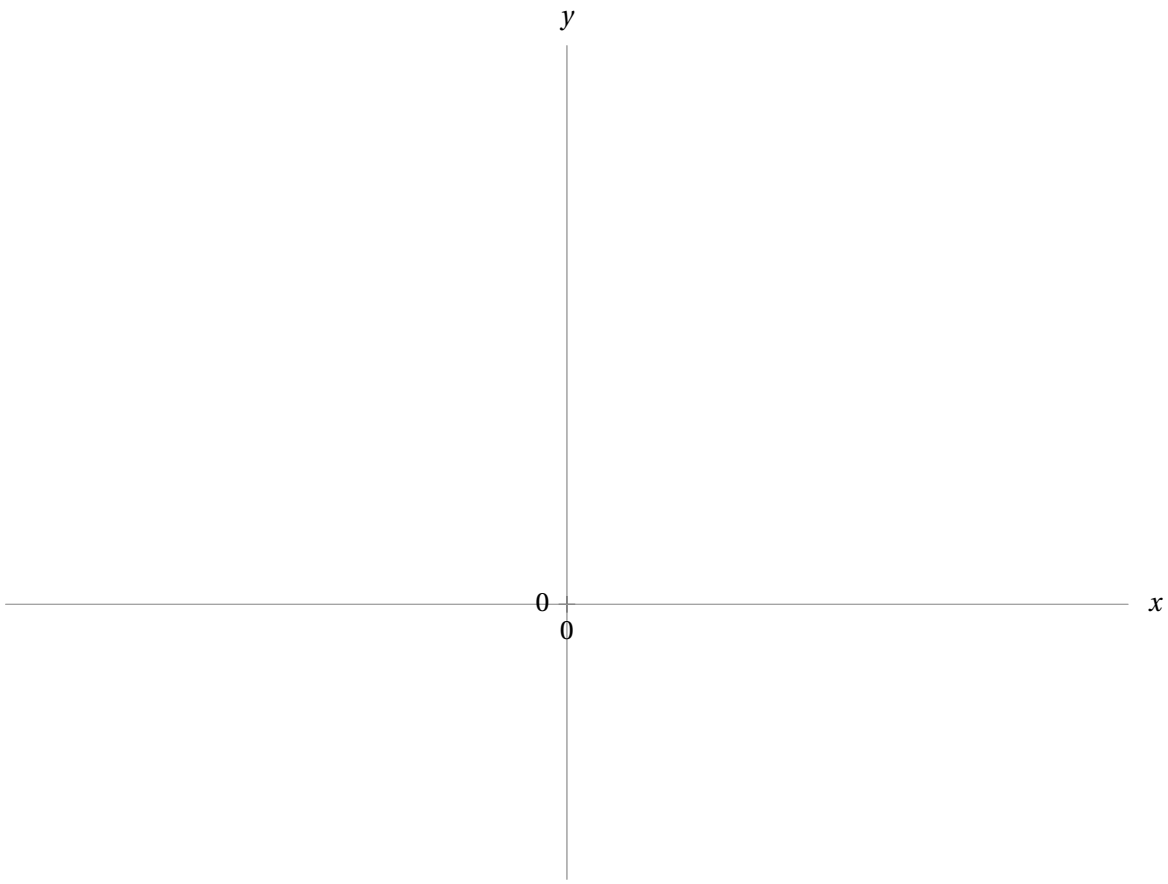
   (b) Independent of this model, the US Census Bureau estimates that the *current* US population is $332,403,650$ people. How does this estimate compare to the current US population that their model predicts?

3. Let g be the function defined piecewise as

$$g(x) = \begin{cases} -1 & \text{if } x < -3 \\ x+3 & \text{if } -3 \le x < 1 \\ -x^2+5 & \text{if } 1 \le x \end{cases}$$

(a) Accurately sketch the graph $y = g(x)$ on the axis below, and on your sketch label all of the following points with their coordinates:

- the y-intercept and *all* x-intercepts
- the points $(-4, g(-4))$, $(5, g(5))$, $-3, g(-3)$, and $1, g(1)$.
- the point where g attains its maximum value



(b) (Challenge) You'll notice that the graph of g is not a "continuous" curve: the pieces of the graph of g don't line up with each other at $x = -3$. How could you change the formula for the "middle" piece of g where $-3 \le x < 1$ in such a way that the three pieces of the graph would connect?