

Any answers which require logarithms to be expressed should be put in terms of natural or common logarithms. Show all work.

1. **(8 points)** There are currently 5000 inhabitants of the luckless town of Dunwich, MA, and its population *decreases* by 8% each year due to emigration, death, and mysterious disappearances.

(a) **(4 points)** Construct a function $f(t)$ to describe the population of Dunwich in t years.

(b) **(4 points)** The remaining denizens of the town will abandon it when there are only 200 people left. When will this occur?

2. **(3 points)** Find the equation of the line through the points $(-3, 6)$ and $(-1, 10)$.

3. **(6 points)** Identify the domains of the following functions:

(a) **(3 points)** $f(x) = \frac{2x^3 - 5}{x^2 + x - 6}$

(b) **(3 points)** $g(t) = \sqrt{3 - t} - \sqrt{2 + t}$

4. **(3 points)** If $f(x) = 3x^2 - 2x$, simplify the expression $f(a + h) - f(a)$.

5. **(2 point bonus)** If $f(x)$ is an odd function and $g(x)$ is an even function, what (if anything) can be said about $f \circ f$, $f \circ g$, $g \circ f$, and $g \circ g$? Justify your claims on the back of this paper.