2. [16 points] The five parts of this question are unrelated to each other.

a. [3 points] \( f(x) \) is a periodic function with domain \((-\infty, \infty)\), with a period of 5, with an amplitude of 2, and with midline \( y = -1 \). Find the amplitude, period and midline of \( g(x) = -7f(2(x - 3)) + 1 \).

   The period of \( g(x) \) is ________________.
   The amplitude of \( g(x) \) is ________________.
   The midline of \( g(x) \) is ________________.

b. [2 points] Let \( a, b, c > 0 \) be positive constants. Evaluate the following limit. You do not need to show any work for this part.

   \[
   \lim_{x \to \infty} \frac{(\sqrt{x} + 2)^6}{ax^3 + bx + c} = ________________.
   \]

c. [3 points] The graph of a polynomial \( y = P(z) \) with its end behavior shown is graphed below. Answer the following questions about \( P(z) \).

   Is the degree of \( P(z) \) even or odd?
   even    odd    not possible to tell

   Is the leading coefficient of \( P(z) \) positive or negative?
   positive    negative    not possible to tell

   What is the smallest possible degree of \( P(z) \)?
   The smallest possible degree of \( P(z) \) is ________________.
2. (continued) Reminder: The parts of this question are unrelated to each other.

**d.** [3 points] The table below gives some values of a function \( M(t) \) at different \( t \)-values.

<table>
<thead>
<tr>
<th>( t )</th>
<th>( M(t) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>625</td>
</tr>
<tr>
<td>3</td>
<td>900</td>
</tr>
<tr>
<td>5</td>
<td>1296</td>
</tr>
</tbody>
</table>

What type of function could \( M(t) \) be? Circle all that apply.

- linear
- exponential
- quadratic
- none of these

Could \( M(t) \) be proportional to \( t^2 \)?

- yes
- no

If you answered no, briefly explain why not, and if you answered yes, find the constant of proportionality.

**e.** [5 points] Consider the function, \( H(t) = 3e^{1.2t-3} \), that gives the weight, in grams, of a mealworm \( t \) days after it hatches. Find the weight of a mealworm when it hatches, find the daily (non-continuous) growth rate of \( H(t) \), and find the amount of time it takes for a mealworm to triple in weight, all in exact form, with appropriate units. Be sure to show all your work.

The weight when it hatches is __________________________.

The daily (not continuous) growth rate is __________________________.

The time it takes to triple in weight is __________________________.