

**Problem statement** a) Suppose  $f_n(x) = x^n 2^{-x}$ . Graph  $f_n(x)$  for  $0 \leq x \leq 10$  and  $n = 1, 2, 3$ . You may need to adjust the viewing window to see the graph. Describe how the graphs change as  $n$  increases. What features stay the same? Find the  $x$  coordinate  $x_{\max}$  of the highest point of the graph for  $n = 1, 2, 3$ . Plot  $x_{\max}$  as a function of  $n$ . Guess what the graph of  $f_5(x)$  looks like, and what the  $x$  coordinate of the highest point is. Then test your guess by actually generating the graph.

b) Suppose  $g_n(x) = x 2^{-nx}$ . Graph  $g_n(x)$  for  $0 \leq x \leq 10$  and  $n = 1, 2, 3$ . You may need to adjust the viewing window to see the graph. Describe how the graphs change as  $n$  increases. What features stay the same? Find the  $x$  coordinate  $x_{\max}$  of the highest point of the graph for  $n = 1, 2, 3$ . Plot  $x_{\max}$  as a function of  $n$ . Guess what the graph of  $g_5(x)$  looks like, and what the  $x$  coordinate of the highest point is. Then test your guess by actually generating the graph.