Models pretest

IB11

Non-calculator section.

Name:_____

Remember to show your work in every exercise.

1. Define:

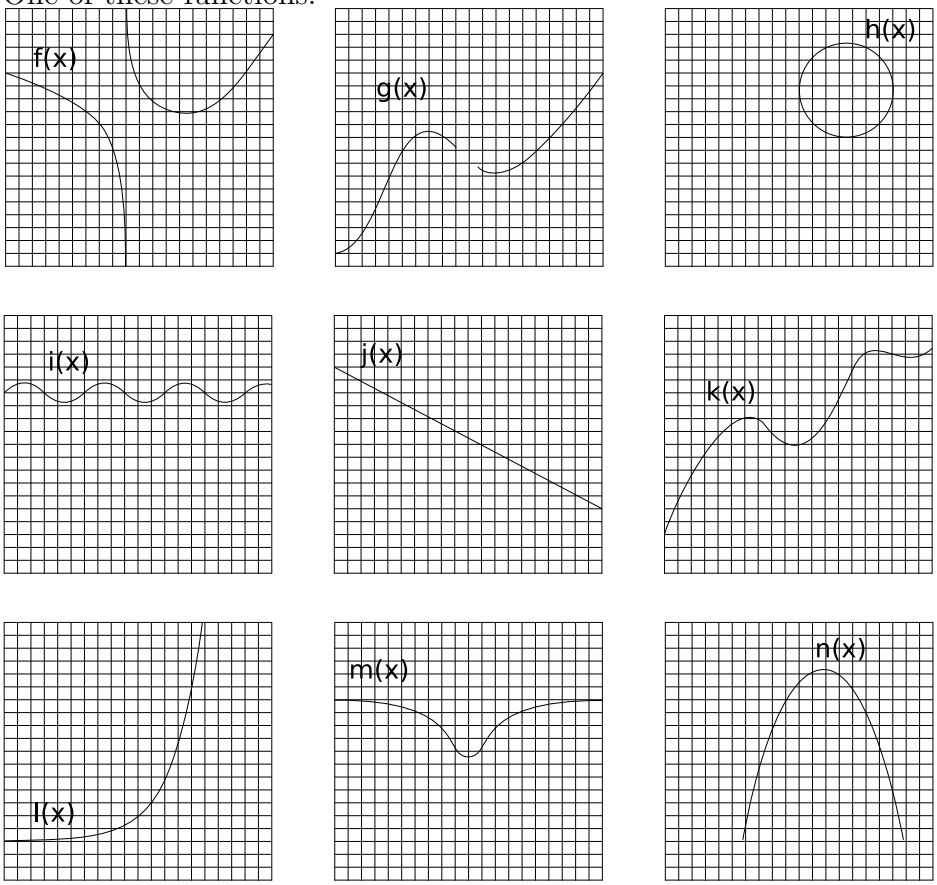
   a) A function is
   (1 0 0)

   b) The domain of a function is
   (1 0 0)

   c) The range of a function is
   (1 0 0)

2. Bonus question: sometimes real variable real functions cannot respond. Could you say why and give an example? (any of the four possible answers is valid).(1 0 0)

3. One of these functions:



   a) When you give it 6 it gives back 8 (0.5 0 0)

   b) Is linear (0.5 0 0)

   c) Has a horizontal asymptote. (0 0.5 0)

   d) Has a vertical asymptote (0 0.5 0)

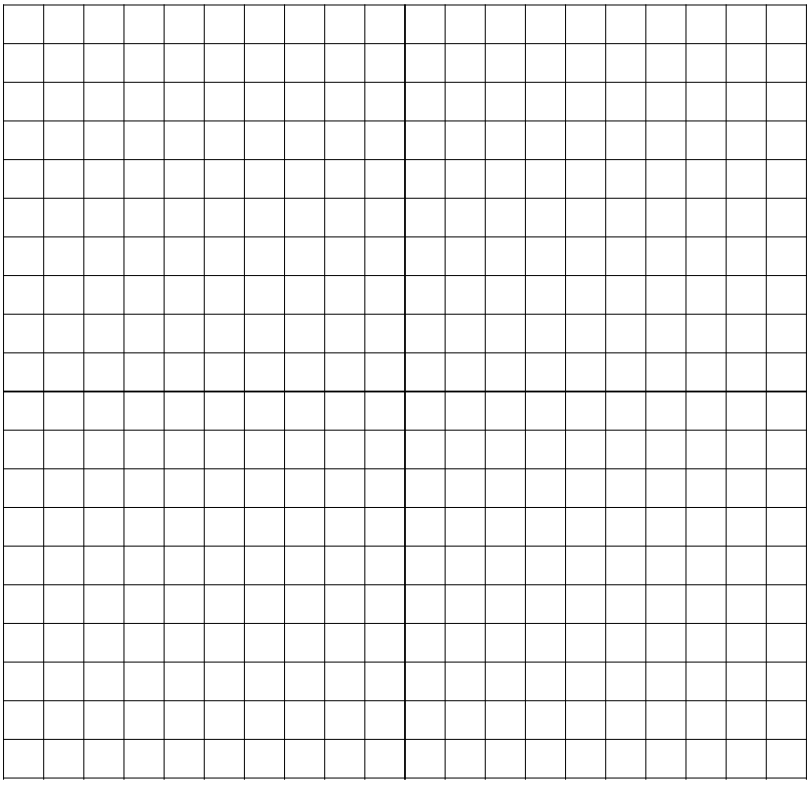
   e) Is a parabole (0 0.5 0)

   f) Never gives back the value 0 (0 0.5 0)

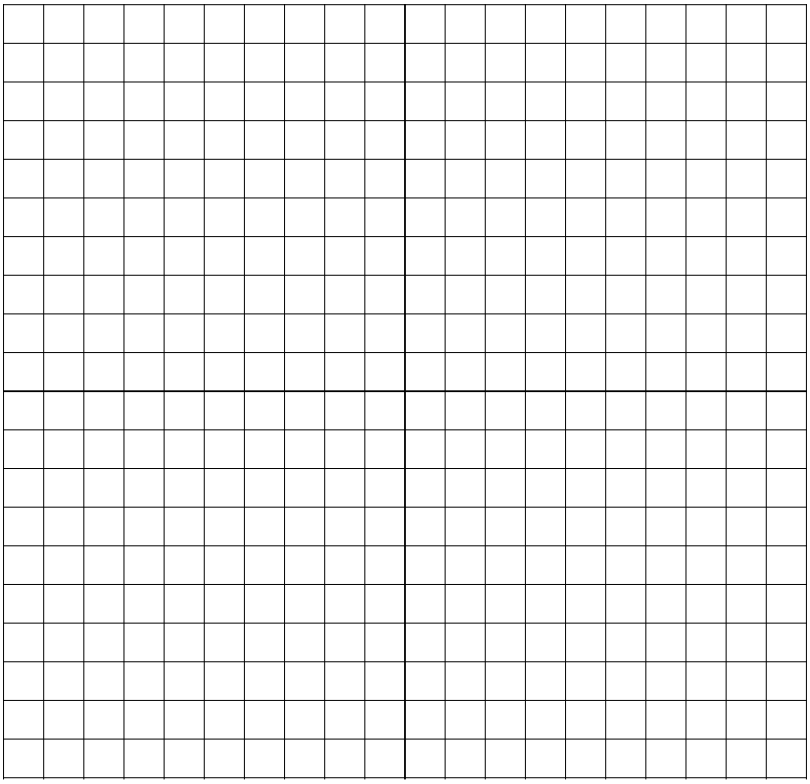
   g) Is exponential (explain how you can tell) (0 1 0)

4. Calculate the equation of the linear function that passes through the points (-3,1) and (6,4). (0 1 0)

5. Sketch the parabole $o(x) = x^2 + 2x - 3$ by finding its apex and intersections with the axis (0 2 0)



6. Bonus question: sketch the parabole $p(x) = x^2 - 4x + 5$ by finding its apex and intersections with the axis (0 1 0)



Models pretest

IB11

Calculator section.

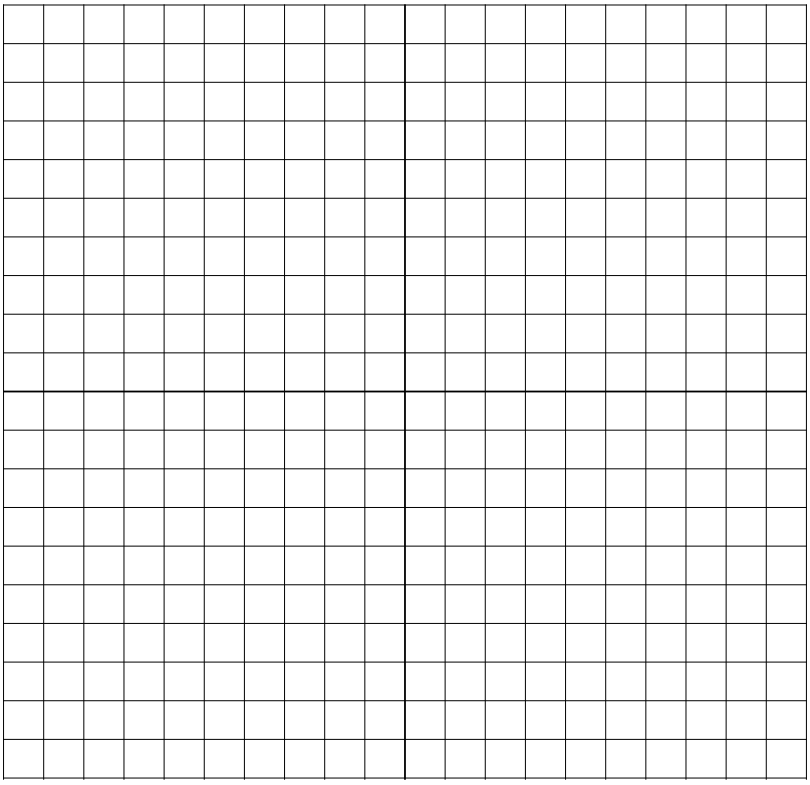
7. Assa and Åsa are bringing fruit to their grandmother. Assa brings strawberries and Åsa brings blueberries, but as they enter the Lagoon Road they notice that there are more berries growing in the bushes by the road, so they decide to pick some more along the way.
   Assa picks four strawberries per meter and puts them in her basket, where she had 388 strawberries to begin with. Åsa picks 7 blueberries per meter and puts them in her bag, where she had 280 blueberries to begin with.

   a) Establish two linear models (functions) for the number of Assa's strawberries and Åsa's blueberries depending on the distance they have walked. (0 1 0)

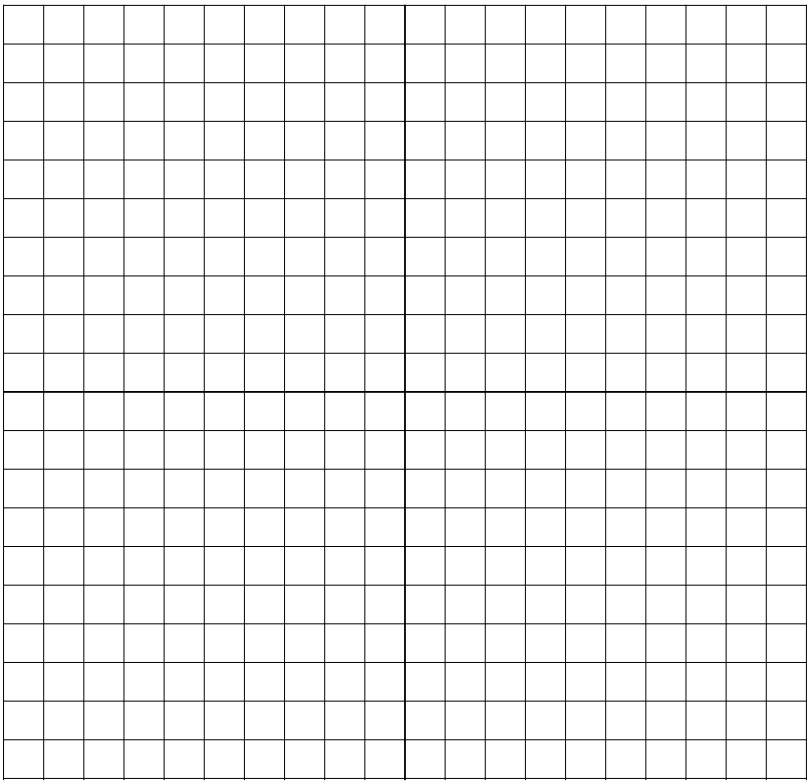
   b) If the Lagoon Road is 50m long, how many berries will each of them have? (0 1 0)

   c) At what point will they have the same number of berries? (0 0 1)

8. Draw the parabole $s(x) = 0{,}2x^2 - x + 3$ (1 0 0)



9. Draw the function $t(x) = \frac{5}{x^2-x-6} + 3$ (0 1 0)



10. A torrent file is very popular and is generating large amounts of internet traffic. The more people have the torrent, the more computers can share it, so the traffic generated by the torrent increases by 4 % every hour. Initially the traffic is 60 GB/s (Gigabyte per second).

    a) Establish a function that works as a model of this behaviour.(1 0 0)

    b) Use the model to predicct the traffic generated by the torrent file after 24 hours.(0 1 0)

    c) What is the time needed for the traffic generated by the torrent to become triple?(0 1 0)

    d) Bonus question: Does the answer to the previous question depend on the initial traffic? Prove your answer.

11. Solve, using the calculator, the equation $-e^{(-x)} + \frac{2}{x^2-8x+16} + \frac{x}{2} + 2 = 3$ (0 1 0)

12. Bonus question: solve, using the calculator, the equation $-e^{(-x)} + \frac{2}{x^2-8x+16} + \frac{x}{2} + 2 = 2$

13. After exposing a bacterial culture to air, the number of bacteria follows the function $v(x) = 1000(\frac{\sqrt{x}+x}{8} + \frac{20}{x})$ where x is the time in minutes.

    a) Find when the number of bacteria is lowest (round it to the nearest hundredth of minute).(0 1 0)

    b) Find then minimum number of bacteria (round it to the nearest bacteria).(0 1 0)