Name: _____ Student Number: _____ Seat: _____

Sample Test 2B *Ensure final answers on this page. Show work on backside and/or extra stapled pages.*

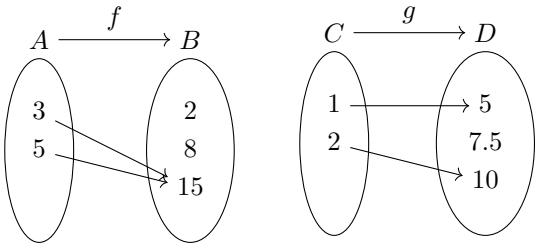
1. Answer "True" (T) or "False" (F) to each of the four questions (i)–(iv), for each function below (f, g, h and t). For each function, you could present your answer in the form "X/X/X/X", answered for (i)/(ii)/(iii)/(iv), where each X is either T (for true) or F (for false) **[4]**

   (i) Is this function injective ("one-to-one")?

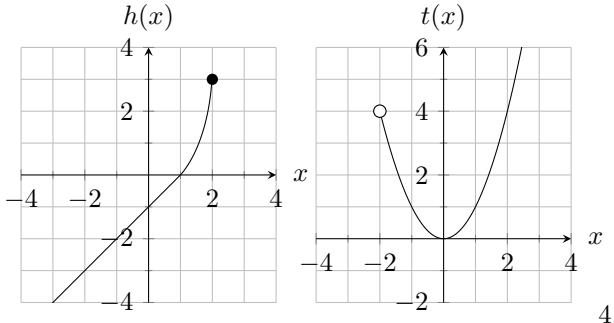
   (ii) Is this function surjective ("onto")?

   (iii) Is this function bijective?

   (iv) Does this function have an inverse?



$h : (-\infty, 2) \to (-\infty, 3)$ $t : (-2, \infty) \to [0, \infty)$



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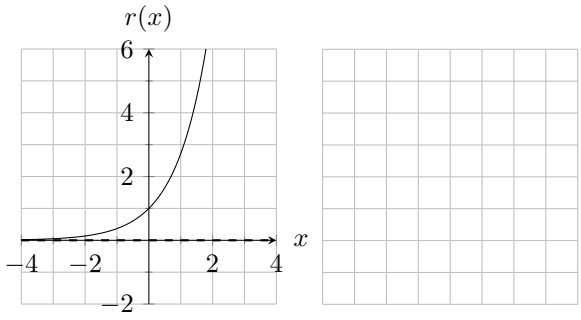
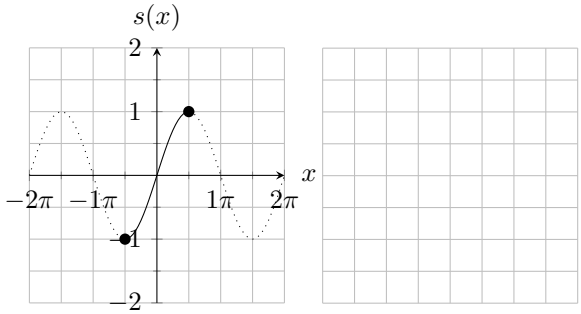
2. Let two functions be $p : [0, \infty) \to [0, \infty) : p(x) = \sqrt{x}$ and $q : \mathbb{R} \to \mathbb{R} : q(x) = x^3$. Draw the graphs of p and q, and, also, express their inverses (p^{-1} and q^{-1}) in "domain-codomain-equation" notation **[4]**

3. r and s, pictured, are functions with inverses (and so each has a domain and codomain which accommodates its inverse). Dotted lines are not part of their respective function, and only act as an aid for you to identify what the function would look like without a restricted domain (dashed lines represent asymptotes). Express r and s in "domain-codomain-equation" notation (like how p and q are expressed in question 2), and, also, draw the inverses of r and s **[4]**





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4. Calculate the following (write "does not exist" if that is the case): **[8]**

   (i) $\sum_{n=2}^{4} (1 - n)$

   (ii) $\lim_{x \to -\infty} \frac{4}{x^3}$

   (iii) $\lim_{x \to 0} -\frac{2}{x^2}$

   (iv) $f'(x)$, if $f(x) = 5x^3$

   (v) $\frac{d}{dx}(x)$

   (vi) $\frac{d}{dx}(-\frac{3}{x^2})$

   (vii) $\frac{d}{dx}(2x^4 + 11x^2)$

   (viii) $\frac{d}{dx}(\frac{6x^4 - 3x^3}{x^2})$