Math 1A: Discussion 9/5/2018

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September 5, 2018

After this week, you should be able to

- Quickly draw the graphs of the following basic functions: x, x^2, x^3, $\sqrt{x}$, $\sin(x)$, $\cos(x)$, e^x. (See website for these graphs)
- Use transformations of graphs to quickly sketch variations of the basic functions.
- Find the composition of functions, $f \circ g$.
- Find the domain of the composition of functions.
- Find the equation of an exponential function given two points.
- Use the Horizontal Line Test to determine if a function has an inverse.
- Find the inverses of basic functions.

Problem Set 1

Question 1

Review of laws of exponents: Simplify the following expressions.

$$16^{3/4}$$

$$\frac{a^3b^5}{a^4b^2}$$

$$(x^2)^{-2}x^3$$

$$(x^2yz)^{-1} \cdot (2xz)^2$$

$$\frac{(2x)^2y^3}{(4x)^{3/2}}$$

Question 2

Solve the following exponential equations. Note that some equations may have no solutions.

$$2^{x+2} = \frac{1}{4}$$

$$\left(\frac{1}{2}\right)^{2-x} = \frac{1}{16}$$

$$3^{(x^2)} = \frac{1}{27}$$

Question 3

Find an equation of the form $y = Ar^x$ that passes through each of the pairs of given points:

- $(3, 1), (5, 4)$
- $\left(-2, \frac{1}{2}\right), \left(2, \frac{1}{32}\right)$
- $\left(2, -\frac{1}{3}\right), (5, -9)$

Problem Set 2

Question 4

Find an expression for the composite function $f \circ g$, and find the domain of this function.

- $f(x) = \frac{3}{x-1}$, $g(x) = e^x$,
- $f(x) = \sqrt{2x-3}$, $g(x) = x + 1$
- $f(x) = \frac{1}{2x^2-5x+2}$, $g(x) = 2^{|x|}$

Question 5

Graph the function. Does it satisfy the horizontal line test? If so, find its inverse.

- $f(x) = 2x^3 + 3$
- $g(x) = -\frac{1}{2}(x-1)^5 + 2$
- $h(x) = |x^4 - 1|$

Question 6

What is $f^{-1}(2)$ for each function? Find an expression for f^{-1}.

$$f(x) = \frac{1}{3}(x-1)^7 + 2$$

$$f(x) = \frac{x+3}{2x+1}$$

Problem Set 3

Question 7 (*)

Graph the following piecewise functions f and g, defined by

$$f(x) = e^{-1/x} \text{ for } x > 0$$

$$f(x) = 0 \text{ for } x \leq 0$$

$$g(x) = e^{\left(\frac{1}{x^2-1}\right)} \text{ for } -1 < x < 1$$

$$g(x) = 0 \text{ for } x \leq -1 \text{ or } x \geq 1$$