

Due date: _____

Name: _____

Tools for Limits (Part 2)

1. Put the following list of numbers in order from least to greatest:

$$\frac{4}{10000}, \frac{4}{10000000}, \frac{4}{0.1}, \frac{4}{0.001}, 4$$

2. Put the following list of numbers in order from least to greatest:

$$\frac{10000}{4}, \frac{10000000}{4}, \frac{0.1}{4}, \frac{0.001}{4}, \frac{1}{4}$$

3. Answer the following questions.

a) _____ $\leq \sin x \leq$ _____

b) _____ $\leq \cos x \leq$ _____

c) _____ $< \tan^{-1} x <$ _____

d) Problems a-c above are asking for the _____ of each function.

e) What is the term of $x^4 - 3x^2 + 2x + 5$ with the highest exponent? _____f) What is the term of $6x^2 + 2x^4 - 1$ with the highest exponent? _____g) What is the term of $4x^2 - 3x^{3/2} + 7$ with the highest exponent? _____h) What is the term of $2x^{1/2} + x - 5$ with the highest exponent? _____i) Rewrite $\sqrt[3]{x}$ using rational exponents. _____j) Rewrite $\sqrt[4]{x}$ using rational exponents. _____k) Rewrite $\sqrt[3]{x^2}$ using rational exponents. _____l) Rewrite $\sqrt{x^5}$ using rational exponents. _____

The following type of simplification will be useful in Math 180 soon:

$$\frac{x}{x^{5/2}} = x^{1-\frac{5}{2}} = x^{-3/2} = \frac{1}{x^{3/2}}$$

4. Simplify $\frac{x^{2/3}}{x}$ as done above. _____5. Simplify $\frac{\sqrt[3]{x}}{x}$ as done above. _____

Here's another type of simplification that will be useful in Math 180 soon:

$$\frac{\sqrt{9x^6-x}}{x^3} = \frac{\sqrt{9x^6-x}}{\sqrt{x^6}} = \sqrt{\frac{9x^6-x}{x^6}} = \sqrt{\frac{9x^6}{x^6} - \frac{x}{x^6}} = \sqrt{9 - \frac{1}{x^5}}$$

For the two examples below, assume x is positive so $x = \sqrt{x^2}$.

6. Simplify $\frac{\sqrt{4x^2+3x-1}}{x}$ as done above. _____

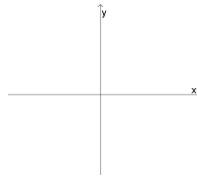
7. Simplify $\frac{\sqrt{x^3+2x^2}}{x}$ as done above. _____

8. $x = \sqrt{x^2}$ is true when x is positive. How would this change if x were negative? _____
(Hint: Try plugging in some negative numbers. How can you modify $x = \sqrt{x^2}$ to make it correct again?)

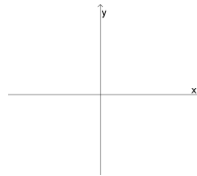
Practice at home

9. Write a basic example of each of the following functions, and draw a quick sketch of its graph.

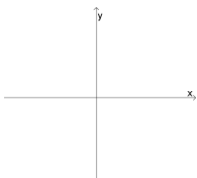
a) Polynomial $f(x) =$



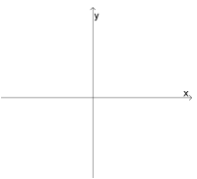
b) Rational $f(x) =$



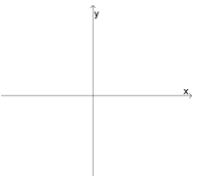
c) Trigonometric $f(x) =$



d) Inverse Trigonometric $f(x) =$



e) Exponential $f(x) =$



f) Logarithmic $f(x) =$

