

Due date: \_\_\_\_\_

Name: \_\_\_\_\_

## Tools for Limits (Part 2)

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

$$\frac{4}{30000}, \frac{4}{30000000}, \frac{4}{0.3}, \frac{4}{0.003}, 4, \quad \frac{4}{30000000}, \frac{4}{30000}, 4, 0.3, \frac{4}{0.003}$$

$$\frac{30000}{4}, \frac{30000000}{4}, \frac{0.3}{4}, \frac{0.003}{4}, 4, \quad \frac{0.003}{4}, \frac{0.3}{4}, 4, \frac{30000}{4}, \frac{30000000}{4}$$

2. Answer the following questions.

a)  $-1 \leq \sin x \leq 1$

b)  $-1 \leq \cos x \leq 1$

c)  $-\frac{\pi}{2} < \tan^{-1} x < \frac{\pi}{2}$

d) Problems a-c above are asking for the range of each function.e) What is the term of  $x^4 - 3x^2 + 2x + 5$  with the highest exponent?  $x^4$ f) What is the term of  $6x^2 + 2x^4 - 1$  with the highest exponent?  $2x^4$ g) What is the term of  $4x^2 - 3x^{3/2} + 7$  with the highest exponent?  $4x^2$ h) What is the term of  $2x^{1/2} + x - 5$  with the highest exponent?  $x$ i) Rewrite  $\sqrt[3]{x}$  using rational exponents.  $x^{1/3}$ j) Rewrite  $\sqrt[4]{x}$  using rational exponents.  $x^{1/4}$ k) Rewrite  $\sqrt[3]{x^2}$  using rational exponents.  $x^{2/3}$ l) Rewrite  $\sqrt{x^5}$  using rational exponents.  $x^{5/2}$ 

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

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

3. Simplify  $\frac{x^{2/3}}{x}$  as done above.

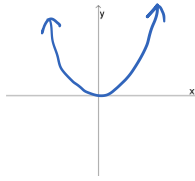
$$\frac{x^{2/3}}{x} = x^{2/3-1} = x^{-1/3} = \frac{1}{x^{1/3}}$$

4. Simplify  $\frac{\sqrt[3]{x}}{x}$  as done above.

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

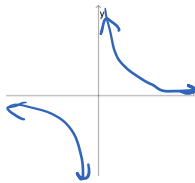
5. Write a basic example of each of the following functions, and draw a quick sketch of its graph.

a) Polynomial  $f(x) = x^2$



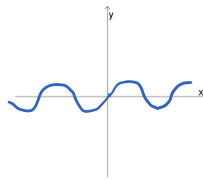
(Answers may vary.  
For example,  $f(x) = x$   
or  $f(x) = x^3$ .)

b) Rational  $f(x) = \frac{1}{x}$



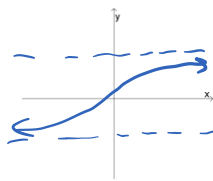
(Answers may vary.  
For example,  $f(x) = \frac{1}{x^2}$ .)

c) Trigonometric  $f(x) = \sin x$



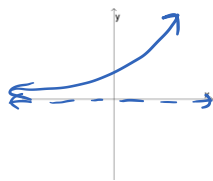
(Answers may vary.  
For example,  $f(x) = \cos x$   
or  $f(x) = \tan x$ .)

d) Inverse Trigonometric  $f(x) = \tan^{-1} x$



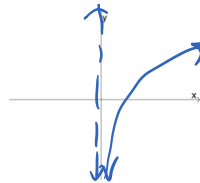
Or  $\sin^{-1} x$ ,  $\cos^{-1} x$ ,  $\csc^{-1} x$ ,  
 $\sec^{-1} x$ ,  $\cot^{-1} x$ .

e) Exponential  $f(x) = e^x$



(Answers may vary.  
For example,  $f(x) = 2^x$   
or  $f(x) = 3^x$ .)

f) Logarithmic  $f(x) = \ln x$



(Answers may vary.  
For example,  $f(x) = \log_2 x$   
or  $f(x) = \log_3 x$ .)