MATH 132 - Michigan State University
December 10 2018.

Final Exam Review: Worksheet 2

Limit Problems:

1. $\lim_{t\to -3} \dfrac{6+4t}{t^2+1}$

2. $\lim_{x\to 8} \dfrac{x^2-7x-8}{8-x}$

3. $\lim_{x\to 4} \dfrac{\sqrt{x}-2}{x-4}$

4. $\lim_{x\to 0} \dfrac{\sin(3x)}{x}$

5. $\lim_{x\to 0} \dfrac{\sin(2x)}{4x}$

6. $\lim_{x\to 1} \dfrac{x^{63}-1}{x-1}$

7. $\lim_{x\to -1} \dfrac{x^{28}-1}{x+1}$

8. $\lim_{h\to 0} \dfrac{\sin(\pi+h)}{h}$

9. $\lim_{h\to 0} \dfrac{\tan\left(\frac{\pi}{4}+h\right)-1}{h}$

10. $\lim_{x\to 2} \dfrac{x^2+5x-14}{x^2-2x}$

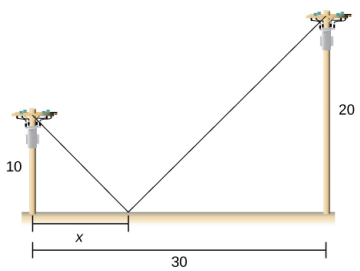
Optimization Problems:

11. We need to enclose a rectangular field with a fence. We have 500 feet of fencing material and a building is on one side of the field and so won?t need any fencing. Determine the dimensions of the field that will enclose the largest area.

12. Find two positive integers such that their sum is 10 and the sum of their squares is
(a). minimal;
(b). maximal.

13. A cylindrical can, with a top lid, must contain $300cm^3$ of liquid. What dimensions (height and radius) will minimize the cost of metal needed to construct the can?

14. Suppose we have $300cm^2$ of metal material to make a cylindrical can (with a top lid). What are the dimensions of the can with maximum volume we can build?



15. Two poles are connected by a wire that is also connected to the ground. The first pole is $20ft$ tall and the second pole is $10ft$ tall. There is a distance of $30ft$ between the two poles. Where should the wire be anchored to the ground to minimize the amount of wire needed?

16. A patient's pulse measures 70 bpm, 80 bpm, then 120 bpm. To determine an accurate measurement of pulse, the doctor wants to know what value minimizes the expression

$$(x-70)^2+(x-80)^2+(x-120)^2$$

What value minimizes it?