ACMAT161 Summer 2024
Professor Manguba-Glover
Classwork 17 & 18 Name: _____

Complete as many of the following problems as you can with your table in the allotted time. You do not have to go in order.

Classwork 17

1. Graph the function $f(x) = 3x^4 - 4x^3$ using curve sketching steps. Indicate inflection points and relative extrema.
2. Graph the function $f(x) = \frac{10x^3}{x^2-1}$. Indicate asymptotes, inflection points, and relative extrema.
3. Sketch the graph of $\dfrac{x-1}{x+2}$. Indicate asymptotes, inflection points, and relative extrema.

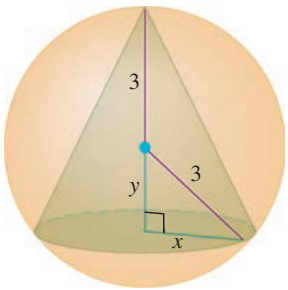
Key:

1. Check with a graphing utility
2. Check with a graphing utility
3. Check with a graphing utility

Classwork 18

1. A 216 m^2 rectangular pea patch is to be enclosed by a fence and divided into two equal parts by another fence parallel to the one of the sides. What dimensions for the outer rectangle will require the smallest total length of fence? How much fence will be needed?

2. Find the volume of the largest right circular cone that can be inscribed in a sphere of radius 3.



3. A farmer is constructing a rectangular pen with one additional fence across its width. Find the maximum area that can be enclosed with 2400m of fencing.

4. A rectangular box has a base that is a square. The perimeter of the base plus the height of the box is equal to 3 feet. What is the largest possible volume for such a box, and what are its dimensions?

5. Find the linearization $L(x)$ of $f(x)$ at $x = a$: $f(x) = x^3 - 2x + 3$, $a = 2$

6. Find the linearization $L(x)$ of $f(x)$ at $x = a$: $f(x) = \tan x$, $a = \pi$

7. Find dy of $y = x^3 - 3\sqrt{x}$

8. Use linear approximation to approximate $\sqrt[3]{29}$. Is this an over or underestimate?

9. Use linear approximation to approximate $\sqrt[3]{65}$

10. Find the differential dy for the following:

    (a) $y = x\sqrt{1 - x^2}$

    (b) $y = \cos(x^2)$

Key:

1. $x = 12$m and $y = \dfrac{216}{12} = 18$m
2. $\frac{32\pi}{3}$
3. 240000 ft^2
4. $\frac{1}{4}$ ft^3
5. $10x - 13$
6. $x - \pi$
7. $\left(3x^2 - \frac{3}{2\sqrt{x}}\right)dx$
8. $3 + \frac{2}{27}$ or $\frac{83}{27}$
9. $4 + \frac{1}{48}$
10. $-2x\sin(x^2)dx$