MATH 5A - TEST 3 SAMPLE
(2.9, 3.1-3.5, 3.7)

SHOW WORK ON TEST PAPER. NO GRAPHING CALCULATORS ALLOWED.

CIRCLE T FOR TRUE, F FOR FALSE.

T F (1) If $f'(c)$ is undefined then the graph of f has a cusp at c.

T F (2) The graph of f(x) = $\dfrac{x^2 - 3x + 1}{3x^2 + 5}$ has horizontal asymptote y=$\frac{1}{3}$.

T F (3) If c is a critical number of f, then f has an local extreme value at c .

T F (4) If y = sin(5x) then dy= cos(5x).

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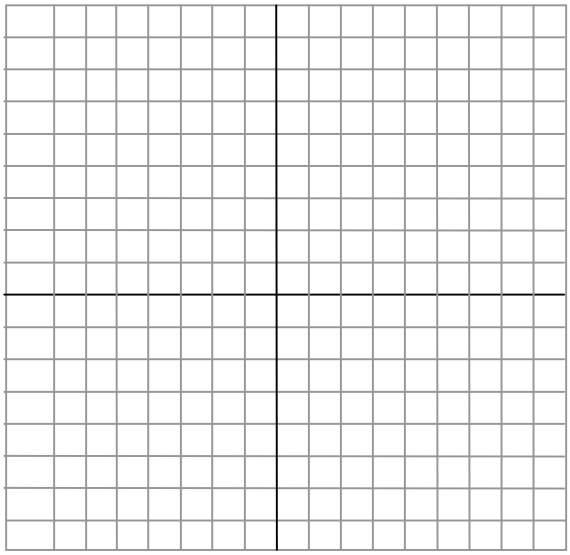
T F (5) If f(x) has an absolute maximum at c then $f'(c)$=0

(6) Given f(x) = $3x^4-16x^3+18x^2$.
Graph. Show how you determine local extrema, inflection points, end behavior and intercepts.



(7) Given f(x) =$\sin^2 x$ - 2cosx
(a) Find all critical numbers.
(b) Find local extrema.
(c) Find absolute extrema of f(x) on the interval $[0, 3\pi]$

(8) (a) Does Rolle's Theorem apply to the given function? If so, find "c". If not, why not?

$f(x) = x^{2/3}$, [-1,1].

(b)Does the Mean Value Theorem apply to the given function? If so, find "c". If not, why not?

$f(x) = x^3 - x, \quad x \in [0, 2]$

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(9) Find the point on the curve $y=\sqrt{x}$ for $0 \le x \le 9$ that is the closest to the point (2,0) and find the point that is the farthest from (2,0).

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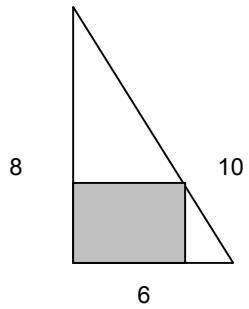
(10) A rectangle is to be inscribed in a right triangle having sides of length 6, 8, and 10 as shown. Find the dimensions of the rectangle with greatest possible area. (Show all steps you used to determine maximum is absolute)



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(11) Using theorems from this class, clearly explain why $x^3 + x - 1 = 0$ has exactly one real root.

(12) Use differentials or linear approximation to approximate $\sqrt[3]{8.03}$.

Graphing Practice

Graph and discuss the following functions.

The goal is not just to obtain the graph. The goal is to show how calculus can be used to help you obtain the graph.

Specifically, your presentation must include discussion of domain, intercepts, vertical and horizontal tangents if any, vertical and horizontal asymptotes if any, sign charts for $f', and\ f''$, local extrema and inflection points. *(10 points each)*

(a) f(x) = $\dfrac{\sqrt{2x^2+1}}{3x-5}$

(b) $f(x) = \dfrac{\cos x}{2+\sin x}$

(c) f(x) = $x^{3/5}(4-x)$.