

Name

Show all your work and reasoning for maximum credit. Do not use a calculator, book, or any personal paper. You may ask about any ambiguous questions or for extra paper (but hand it back in). Good luck!

1) (15 pts) Compute and simplify;

$$\int \sqrt{1+2x} \, dx =$$

$$\int \sec(x) \tan(x) \, dx =$$

$$\int \frac{1-2t^3}{t^3} \, dt =$$

2) (10 pts) Find the maximum and minimum values of $f(x) = |6 - 4x|$ on the interval $[-3,3]$.

3) (20 pts) Compute;

$$\frac{d}{dx} \sin(x^3)$$

$$\frac{d}{dx} \frac{3}{\sqrt{x+2}}$$

$$\frac{d}{dx} \cot(x)$$

Find dy/dx , given that $x^2 + y^2 = 100$

4) (10 pts) CHOOSE ONE;

A) State and prove Rolle's Theorem.

B) State the definition of limit, and use it to prove that $\lim_{x \rightarrow 10} 4x + 50 = 90$.

5) (10 pts) A rancher has 200 feet of fencing with which to enclose two adjacent rectangular corrals (see figure below or on the board). What dimensions should be used so that the enclosed area will be a maximum? [If you don't understand this story, ask me!]

6) (10 pts) Find the slope of the tangent line to the curve, $x = 2 \cos(t)$, $y = \sin(t)$ at the point where $t = \pi/6$. For maximum credit, use the chain rule as done in class.

7) (10 pts) Answer TRUE or FALSE:

The sum of any two continuous functions defined on $(-\infty, +\infty)$ is also continuous.

A continuous function defined on $(-\infty, +\infty)$ must have a minimum value.

A rational function is continuous everywhere except at the points where the denominator is zero.

If f is differentiable on the open interval (a, b) then it is continuous on the closed interval $[a, b]$.

The function $\cot(x)$ is continuous on the interval $(-\pi/4, \pi/4)$.

8) [5pts] Compute $\lim_{x \rightarrow +\infty} (1 + 2/x)^x =$

9) [5pts] Find all the discontinuities of $f(x) = \csc(x)$.

10) [5pts] Suppose a particle has position $s(t) = t^3/3 - 2t^2 + 5$ [so, $v(t) = t^2 - 4t$ and $a(t) = 2t - 4$] for $t \geq 0$. When is the particle speeding up? slowing down? Explain briefly.