

Name: _____

Test 3
Summer 2007
MTH121 Section 01
July 18, 2007

Directions : You have 60 minutes to complete all 5 problems on this exam. There are a possible 100 points to be earned. You may not use your book, notes, or any graphing/programmable calculator. Please be sure to show all pertinent work. *A correct answer with no work will receive very little credit!* If any portion of the exam is unclear please come to me and I will elaborate provided I can do so without giving away the problem.

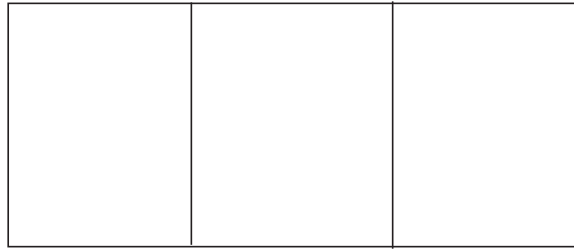
1. (20 points)

Let $f(x) = x^3 - 4x$.

- (a) What is the domain of $f(x)$?
- (b) Where are the x and y intercepts?
- (c) Where are the horizontal/vertical asymptotes?
- (d) Where is $f(x)$ increasing/decreasing?
- (e) Identify all critical points as local maxima/minima and determine their value.
- (f) Where is $f(x)$ concave up/concave down and where are the inflection points?
- (g) Sketch the graph of $f(x)$.

2. (20 points)

A scientist working for the Umbrella Corporation wishes to enclose a rectangular area into three pens of equal area as seen below. One pen will house those given a fatal dose of the T-virusTM, the second pen will hold those from the first pen that have died and since reanimated as zombies, and the third will hold those who know too much. What are the dimensions that maximize the area provided only 1000 ft of fencing is used to construct the pens?



3. (20 points)

Use a Riemann sum to approximate the area under the curve $y = x^2 - 2x - 3$ where $2 \leq x \leq 6$ using 4 intervals.

4. (20 points)

Let $v(t) = t^2 - 4t + 3$ represent the velocity of a particle moving on a straight line at time t .

- (a) What is the displacement of the particle from time $t = 0$ to time $t = 4$?
- (b) What is the total distance the particle traveled from time $t = 0$ to time $t = 4$?

5. (20 points)

Compute the following:

a) $\frac{d}{dx} \int_0^{3x^2} 3t \sqrt{t^3 - \sin(t)} dt$

b) $\int_{-\pi/2}^{\pi/2} \cos(\theta) \sin(\sin(\theta)) d\theta$