Math 1271 – Practice Problems for Midterm Exam III

Lecturer: ☐ Walter Littman ☐ Jiaping Wang

General remarks: This 50 minute test covers sections 3.11 to 5.3. Calculator is **NOT** allowed.

(1) Find $2^{1/3}$ approximately by solving $f(x) = 0$ by Newton's method where $f(x) = x^3 - 2$ and $x_1 = 1$. Find x_2 and x_3 in the form of fractions $\frac{p}{q}$.

(2) Given $f(x) = x^3 - 3\,x^2 + 3$, find local maxima and minima, points of inflection (if any), intervals where f is increasing, decreasing, concave up, concave down. Sketch the curve $y = f(x)$ for $-1 \le x \le 3$.

(3) Let a, b be two positive numbers. Find

$$\lim_{x \to 1} \frac{x^a - 1}{x^b - 1}.$$

(4) From a piece of cardboard 24in by 24in you are to make an open top box by cutting out equal square corners and folding up the sides. How should the cut be made to maximize the volume?

(5) Find

$$\int_2^4 \frac{1 + x - x^2}{x^2}\, dx.$$

(6) Find

$$\frac{d}{dx}\left(\int_{2x}^{3\,x+1} \sin(t^2)\, dt\right).$$

(7) Estimate $(8.3)^{1/3}$ using linear approximation or differentials.

(8) Let $f(x) = (x+2)^3\, 2^x$. Using the mean value theorem we can conclude that there is at least one number c between 0 and 2 such that $f'(c) =$?