

**Math 163A****Guide for Test 3**

Here are some sample questions from Sections 4.3, and 5.1–3. Some topics that we covered are not represented by these questions, but are still fair game.

1. Compute the following derivatives:

(a)  $\frac{d}{dx} [(x^9 + 2x^{1/3} + x^5 + 3)^4] =$

(b)  $y = (3 + x^4)^8 x^3 \Rightarrow \frac{dy}{dx} =$

(c)  $D_x \left[ ((x^9 + x^8 + x^5 + 3)(1 + 2x^2 + x^3 - 4x^4))^9 \right] =$

2. Let  $f(x) = \frac{x^3}{3} - 2x^2 + 3x + 1$ .

(a) Find the critical points, extrema, and intervals of increase or decrease.

(b) Find the intervals where it is concave up, and any inflection points.

3. Let  $f(x) = \frac{x}{x^2 + 1}$ .

(a) Find the critical points, extrema, and intervals of increase or decrease.

(b) Find the intervals where it is concave up, and any inflection points.