

Math 211  
Lecture 2

Spring 05/06  
G.Meyer

## Exam 3

Show all work. No work = no credit, even if you have a correct answer.  
References and calculator are not allowed.

1. (12 points) Sketch the graph of  $f(x) = \frac{1}{3}x^3 - 2x^2 + 3x + 1$ . Be sure to mark the relative maxima, relative minima, and points of inflection on your graph.
2. (6 points) Suppose  $f$  is defined for all real numbers  $x$  and satisfies the conditions below; sketch the graph of  $f$ .
  - $f(x) < 0$  for  $x < 0$  and
  - $f(x) > 0$  for  $x > 0$ ;
  - $f'(x) > 0$  for all  $x$ .
  - $f''(x) < 0$  on  $(-\infty, -1)$  and
  - $f''(x) > 0$  on  $(-1, \infty)$ .
3. (14 points) Find these integrals
  - (a)  $\int \sqrt{3x - 2} dx$
  - (b)  $\int x^5 \ln x dx$
4. (10 points) Find the integral:  $\int \frac{1}{(x-1)(x+1)} dx$
5. (6 points) Find the area of the region between the curve  $y = x^5$  and the  $x$ -axis, from  $x = -1$  to  $x = 2$ .
6. (8 points) Estimate the integral  $\int_1^2 f(x) dx$  by using a Riemann sum with a uniform partition of five subintervals and by evaluating the function the function at the left side of each interval, when the following values of the function are given:
 

$x$	1	1.2	1.4	1.6	1.8	2
$f(x)$	0.8	0.2	-0.5	-0.9	-1.1	-1.3
7. (6 points) Find the average value of  $f(t) = \frac{1}{x^2}$  over the interval  $[1, 3]$ .

8. (8 points) Solve the initial value problem:

$$\frac{dy}{dx} = \frac{x-1}{y}$$

$$y(1) = 2.$$