Name:
GSI's Name:
Section:

Midterm 1
Math 1B, Fall 2008
Wilkening

0	1	
1	5	
2	5	
3	5	
4	7	
5	6	
6	3	
total	32	

0. (1 point) write your name, your GSI's name, and your section number on your exam.

1. (5 points) Evaluate the integral: $\int x \sin x \cos x \, dx$

2. (5 points) Find a and b: $\int_1^{\frac{2}{\sqrt{3}}} \frac{\sqrt{x^2-1}}{x}\,dx = a - \frac{\pi}{b}$

3. (5 points) Evaluate the integral: $\int \frac{x^4+1}{x^3-x}\,dx$

4a. (2 points) Write down the equation of the parabola $p(x)$ such that

$$p(1) = 1, \qquad p(2) = 0, \qquad p(3) = 0.$$

4b. (2 points) With $p(x)$ as above, evaluate $\displaystyle\int_1^3 p(x)\,dx$

4c. (3 points) Let $f(x) = (x+2)e^{-x}$. Find K_2 such that $|f''(x)| \leq K_2$ for $0 \leq x \leq 3$.

5a. (3 points) Prove that

$$\cos x \geq 1 - \frac{2}{\pi}x \quad \text{for} \quad 0 \leq x \leq \frac{\pi}{2}$$

5b. (3 points) Use part (a) to show that the following integeral is convergent:

$$\int_0^{\pi/2} \frac{1}{\sqrt{\cos x}}\, dx$$

6. (3 points for correct answer, -1 for wrong answer, 0 for blank)

Let $F(x) = \int_x^\infty e^{-t^2}\,dt$. Evaluate $\int_0^\infty F(x)\,dx$.

(a) -1/2
(b) 1/2
(c) 1
(d) ∞
(e) cannot be expressed in terms of elementary functions