MATH 2300-004 QUIZ 5 Name: _____

Collaborators (if any):

Due Friday, February 22th at the beginning of class. Submit your work on additional paper, treating this page as a cover sheet. You may use technology and work with with other students. If you work with others, please list their names above. SHOW YOUR WORK!

---

1. Do exercise 21, section 6.6 of the text.
2. Find the centroid of the region bounded by the given curves.
   (a) $y = \cos x,\ y = \sin x,\ \pi/4 \le x \le 3\pi/4.$
   (b) $y = 1/x^3,\ y = 0,\ 1 \le x < \infty.$
3. Determine whether the sequence converges or diverges. If it converges, find its limit.
   (a) $a_n = \dfrac{e^n + e^{-n}}{e^{2n} - 1}$
   (b) $b_n = \ln(2n^2 + 1) - \ln(n^2 + 1)$
   (c) $c_n = \sqrt[n]{2^n + 3^n}$
   (d) $d_n = \dfrac{\sin(n) \ln n}{n}$
   (e) $e_n = \left(1 + \dfrac{t}{n}\right)^n$, where t is a constant.
4. Show the following:
   (a) For any $\epsilon > 0$, $\lim\limits_{x \to \infty} \dfrac{\ln x}{x^\epsilon} = 0$, (i.e., $\ln x$ grows more slowly than any power of x).
   (b) For any $p > 0$, $\lim\limits_{x \to \infty} \dfrac{x^p}{e^x} = 0$, (i.e., e^x grows more quickly than any power of x).