MA 241 - Calculus II Name: _____

Recitation Worksheet 6 Recitation Section: _____

1. Determine whether the following integrals converge or diverge.

   (a) $\displaystyle\int_1^\infty \frac{\sin(x)\cos(x)}{x^{3/2}}dx$

   (b) $\displaystyle\int_5^\infty \frac{x}{x^2+5}dx$

2. Let $f(x) = \dfrac{1}{x}$.

   (a) Calculate the volume of the solid of revolution of $f$, rotating $f$ about the $x$-axis, on the interval $x \in [1, \infty)$. (recall that the formula is $V = \pi \int_a^b f(x)^2 dx$)

   (b) The surface area of a solid of revolution constructed by rotating $y = f(x)$ about the $x$ axis is given by $SA = 2\pi \int_a^b f(x)\sqrt{1 + f'(x)^2}dx$ (note the similarity to the arc length formula!). Calculate the surface area of the solid of revolution of $f$, rotating $f$ about the $x$-axis, on the interval $x \in [1, \infty)$.

3. Determine the following improper integrals

   (a) $\displaystyle\int_{-\infty}^{\infty} xe^{-x^2}dx$

   (b) $\displaystyle\int_{-\infty}^{\infty} \sin(x)dx$

   (c) $\displaystyle\int_{0}^{5} \frac{1}{\sqrt{5-x}}dx$

   (d) $\displaystyle\int_{0}^{\infty} \frac{1}{x}dx$