Name _____ Student Number _____

Assignment 1

MAT1322-3X, Summer 2014
Due May 22 by 5pm

1. Use the definition of improper integrals to determine if each of the following improper integral is convergent or divergent. If it is convergent, find its value.

(a) $\int_{-1}^{2} \frac{1}{\sqrt{x+1}}\,dx$;

Solution.

(b) $\int_2^{\infty} \frac{1}{x\sqrt{\ln x}}\,dx$;

Solution.

2. Use the comparison test to determine if each of the following improper integral is convergent or divergent.

(a) $\int_1^{\infty} \frac{x+1}{\sqrt[4]{x^5+x^2}}\,dx$;

Solution.

(b) $\int_0^1 \frac{x+1}{\sqrt[4]{x^5+x^2}}\,dx$;

Solution.

(c) $\int_0^{\pi/2} \frac{x+\cos^2 x}{\sqrt{x+x^2}}\,dx$.

Solution.

3. Consider the region D under the graph of $y = \sqrt{x}$ and above the graph of $y = x^3$.

(i) Find the area of this region.

Solution.

(ii) Find the volume of the solid obtained by revolving region D about the y-axis.

Solution.

(iii) Find the volume of the solid obtained by revolving region D about the line $y = 2$.

Solution.

(vi) Suppose a solid has region D as the base, and the cross sections perpendicular to y-axis are circular disks. Find the volume of this solid.

Solution.