

Last name _____ First name _____

Student number _____ DGD group _____

Assignment 1

MAT1322D, Fall 2016

Due Monday, October 3 by 2 pm

1. Find the area of the region between the graphs of $y = \sin x$ and $y = \cos x$ in the interval $[0, \pi/2]$.

2. Let R be the region under the graph of $y = \sin x$, $0 \leq x \leq \pi$.
- (a) Find the volume of the solid obtained by revolving this region about the line $y = 2$.
- (b) Find the volume of the solid by revolving this region about the line $x = -1$ using the method of cylindrical shells.

3. A tank is of the shape of the lower half of a sphere with radius 3 meters. It is filled with oil of density $\rho = 850 \text{ kg/m}^3$. Find the work needed to pump the oil in the tank to a point 2 meters above the top of the tank. Use $g = 9.81 \text{ m}^2 / \text{sec}$.

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

(a) $\int_1^2 \frac{1}{\sqrt{2-x}} dx$.

(b) $\int_1^{\infty} \frac{1}{x(x+2)} dx$.

5. Use comparison test to determine whether each of the following improper integral is convergent:

(a) $\int_1^{\infty} \frac{2\sqrt{x}-1}{x+\sqrt{x}} dx.$

(b) $\int_0^1 \frac{2\sqrt{x}+1}{2\sqrt{x}-x} dx.$