Community College of Philadelphia **Spring 2011**
Math 172-Calculus II **Dr. Yun Yoo**

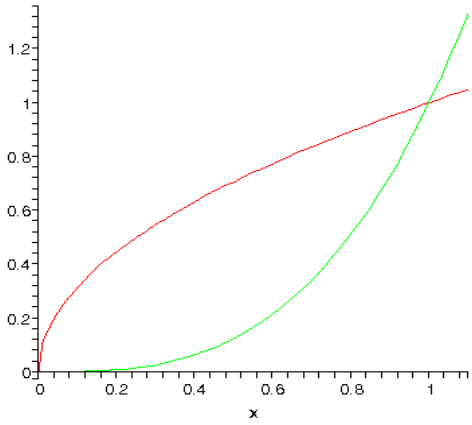
Attendance Quiz 16

Name: _____ Date : _____

You have to study ALL Attendance Quizzes (#9- #15) and HW problems. We recall topics:

Section 7.8	Improper Integrals (# 3)
Section 6.1	Areas between curves (#6)
Section 6.2	Volumes (#1, 2 below)
Section 6.3	Volumes by cylindrical shells (#1, 2 below)
Section 8.1	Arc Length (#4 below)
Section 8.2	Area of a surface of revolution (#5 below)
Section 10.1	Curves defined by parametric equations
Section 10.2	Calculus with parametric cuves (# 9, 10 below)
Section 10.3	Polar coordinates (#8 below)
Section 10.4	Area and lengths in Polar Coordinates (#7 below)

1. Below graph is the plot of $y = x^3$ and $y = \sqrt{x}$.



Set up, *but do not evaluate*, an integral for the volume of the solid obtained by rotating the region bounded by the given curves the specified instructions.

$$y = x^3 \text{ and } y = \sqrt{x}$$

(a) washer method with integrating with respect to *x*. (rotating *x-axis*)
(b) cylindrical shell method with integrating with respect to *y*. (rotating *x-axis*)
(c) washer method with integrating with respect to *y*. (rotating *y-axis*)
(d) cylindrical shell method with integrating with respect to *x*. (rotating *y-axis*)

2. Evaluate # 1 (a), (b), (c), (d). (Note that (a) and (b) are the same answers and also (c) and (d) as well.)

3. Evaluate the integral.

$$\int_0^{\infty} \frac{1}{x^2+1}\,dx$$

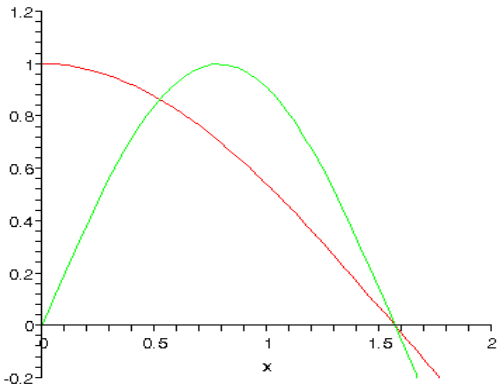
4. Find the length of the curve.

$$y = \frac{x^3}{6} + \frac{1}{2x},\ 1 \le x \le 2$$

5. Find the area of the surface obtained by rotating the curve about the *x-axis*

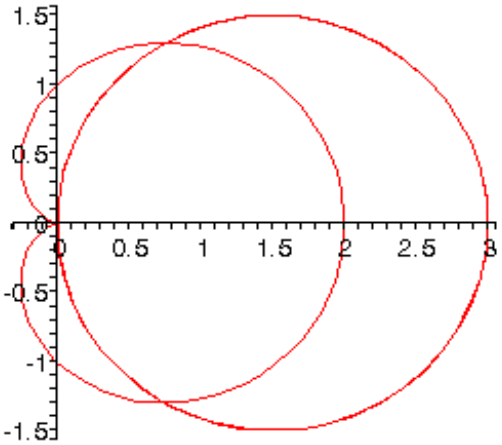
$$y = \frac{x^3}{6} + \frac{1}{2x},\ \frac{1}{2} \le x \le 2$$

6. Below graph is the plot of $y = \cos x$ and $y = \sin 2x$.



Find the area enclosed by $y = \cos x$, $y = \sin 2x$, $x = 0$, and $x = \frac{\pi}{2}$ *with respect to x.*

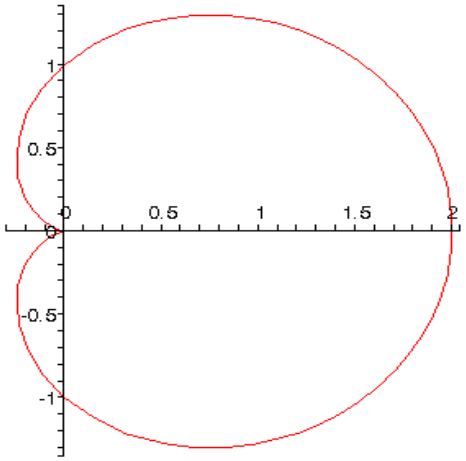
7. Below graph is the plot of $r = 1 + \cos\theta$ and $r = 3\cos\theta$.



(a) Set up, *but do not evaluate*, an integral for finding the area of the region that lies inside the circle $r = 3\cos\theta$ and outside the cardioid $r = 1 + \cos\theta$.

(b) Evaluate (a) now.

8. Below graph is the plot of $r = 1 + \cos\theta$.



(a) For the cardioid $r = 1 + \cos\theta$ find the slope of the tangent line when $\theta = \dfrac{\pi}{6}$.

(b) Find the points from interval $0 \le \theta < 2\pi$ on the cardioid where the tangent line is vertical.

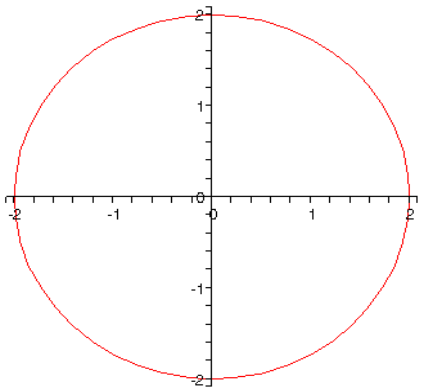
(c) Find the points from interval $0 \le \theta < 2\pi$ on the cardioid where the tangent line is horizontal.

9. (a) Find an equation of the tangent to the curve at the point corresponding to the given value of the parameter.

$$x = 2t^2 + 1,\ y = \frac{1}{3}t^3 - t;\ t = 3$$

(b) Find $\frac{d^2y}{dx^2}$ to the curve at the point corresponding to the given value of the parameter.

10. The plot of the parametric equation $x = r\cos t,\ y = r\sin t,\ 0 \le t \le 2\pi$, (r is a constant) is circle like below. (Specially, $r = 2$)



(a) Find the area enclosed by the curve $x = r\cos t,\ y = r\sin t,\ 0 \le t \le 2\pi$.
(In other words, find the area of circle using the parametric equation)

(b) Find the arclength enclosed by the curve $x = r\cos t,\ y = r\sin t,\ 0 \le t \le 2\pi$.
(In other words, find the circumference of circle using the parametric equation)

(c) Find the surface area obtained by rotating the given curve about the *x-axis* given by the curve $x = r\cos t,\ y = r\sin t,\ 0 \le t \le 2\pi$.
(In other words, find the surface area of sphere using the parametric equation)