

Name: _____

Student ID: _____

Section: _____

Instructor: _____

Math 113 (Calculus 2)

Exam 1

25-29 January 2008

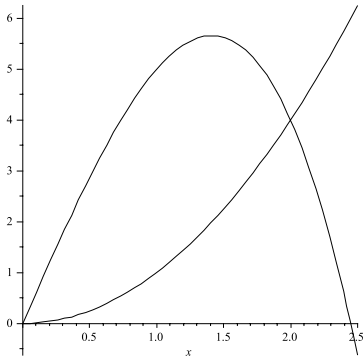
Instructions:

1. Work on scratch paper will not be graded.
 2. Should you have need for more space than is allotted to answer a question, use the back of the page the problem is on and indicate this fact.
 3. Simplify your answers. Expressions such as $\ln(1)$, e^0 , $\sin(\pi/2)$, etc. must be simplified for full credit.
 4. Calculators are not allowed.
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For Instructor use only.

#	Possible	Earned		#	Possible	Earned
1.a	6			4	10	
1.b	6			5.a	8	
1.c	6			5.b	8	
1.d	6			5.c	8	
1.e	6			5.d	8	
2	10			5.3	8	
3	10			Total	100	

1. (30%) Consider the region between the curves $y = x^2$ and $y = 6x - x^3$ in the first quadrant.

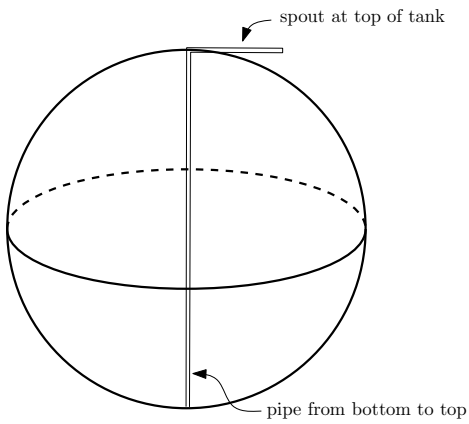


- (a) Set up an integral for the area of the region bounded by the curves. DO NOT EVALUATE.
- (b) Set up an integral for the volume when the region is rotated about the x -axis. DO NOT EVALUATE.
- (c) Set up an integral for the volume when the region is rotated about the y -axis. DO NOT EVALUATE.
- (d) Set up an integral for the volume when the region is rotated about the line $x = -1$. DO NOT EVALUATE.
- (e) Set up an integral for the volume when the region is rotated about the line $y = 6$. DO NOT EVALUATE.

2. (10%) Use the disk method or the shell method to show that the volume V of a sphere with radius r is given by $V = \frac{4}{3}\pi r^3$.

3. (10%) A heavy rope, 100 ft long, weighs 0.5 lb/ft and hangs over the edge of a building 120 ft high. How much work is done in pulling the rope to the top of the building?

4. (10%) A spherical tank having radius 10 feet is filled with a fluid which weighs 100 pounds per cubic foot. This tank is half full. Find the work in foot pounds needed to pump the fluid out of a hole in the top of the tank.



5. (40%) Evaluate the following integrals:

(a) $\int_0^{\pi} x \sin x \, dx$

(b) $\int_0^{\pi} \sin^2(2x) \, dx$

(c) $\int (\ln x)^2 dx$

(d) $\int e^{3\theta} \cos(2\theta) d\theta$

(e) $\int \sin^4 x \cos^3 x dx$