

MATH 114 – 18 FEBRUARY 2013 – EXAM 1

Answer each of the following questions on the answer sheets provided. Do not do any work on this question sheet. When you are done, hand in this question sheet together with your answer sheets. Show all work, as partial credit may be given.

1. Consider an object moving along a line with velocity $v(t) = t^3 - 2t^2$ meters per second for $0 \leq t \leq 5$ seconds.

- (a) (10 pts.) Find the total displacement of the object for t between 0 and 5 seconds.
- (b) (10 pts.) Find the total distance travelled by the object for t between 0 and 5 seconds.
- (c) (10 pts.) Assuming that the initial position of the object is $s(0) = -2$, find an expression for the position, s , of the object at time t .

2. Consider the region bounded by the curves $x = 0$, $y = x^2$, and $y = 4$.

- (a) (10 pts.) Find the area of the region.
- (b) (10 pts.) Use the disk/washer method to find the volume of the solid obtained by rotating the above region about the x -axis.
- (c) (10 pts.) Using the method of cylindrical shells, find the volume of the solid obtained by rotating the above region about the y -axis.
- (d) (10 pts.) Set up but do not evaluate an integral giving the volume of the solid obtained by rotating the above region about the line $y = 4$ using any method you like.

3. (10 pts.) Set up but do not evaluate an integral giving the length of the curve $y = \sin(2x)$ on $[-\pi, \pi]$.

4. (10 pts.) Evaluate the definite integral $\int_0^1 \frac{2x-1}{x+2} dx$.

5. (10 pts.) Between 2005 and 2010, the rate of inflation was 3% per year. If a cart of groceries cost \$100 in 2005, how much would it cost in 2015?