Polytechnic University

MA 1132 — Worksheet II

Instructor: Manocha

Due: February 7, 2007

You must show all of your work for problems (1)-(3) on a separate sheet of paper.

(1) The integrals below represent the area of either a triangle or part of a circle, and the variable of integration measures a distance. In each case, say which shape is represented and give the radius of the circle or the base and height of the triangle. Make a sketch to support your answer showing the variable and all other relevant quantities.

(a) $\displaystyle\int_{-9}^{9} \sqrt{81 - x^2}\, dx$

(b) $\displaystyle\int_{0}^{7} 5\left(1 - \frac{h}{7}\right) dh$

(2) The integrals below represent the volume of either a hemisphere or a cone, and the variable of integration measures a length. In each case, say which shape is represented, and give the radius of the hemisphere or the radius and height of the cone. Make a sketch to support your answer showing the variable and all other relevant quantities.

(a) $\displaystyle\int_{0}^{12} \pi(x/3)^2\, dx$

(b) $\displaystyle\int_{0}^{2} \pi(2^2 - (2 - y)^2)\, dy$

(3) Let $\mathcal{R}$ be the region bounded by the curve $2y = x^2$ and the line $5x - 2y - 6 = 0$.

(a) Find the area of $\mathcal{R}$.
(b) Find the length of the curve $2y = x^2$ between its two points of intersection with the line $5x - 2y - 6 = 0$.
(c) Find the volume of the solid obtained by rotating $\mathcal{R}$ about the line $y = 1$.
(d) Find the volume of the solid obtained by rotating $\mathcal{R}$ about the line $x = -1$.

Attach these pages to the work that you are submitting.

(4) The region bounded by $y = x^2$, $y = 0$, $x = 0$, and $x = 4$ is rotated around the x-axis. Circle the correct choice that gives the volume of the above region. You do not need to show work.

(a) 143π
(b) 143
(c) 643π
(d) 643
(e) 743π

(5) The region bounded by $y = \sqrt{(x+5)}$, $y = 0$, $x = -1$, and $x = 2$ is rotated around the x-axis. Circle the correct choice that gives the volume of the above region. You do not need to show work.

(a) 35.84
(b) 45.84
(c) 51.84
(d) 60.84
(e) 65.84

(6) The region bounded by $y = e^x$, $y = 0$, $x = 2$ and $x = 3$ is rotated around the x-axis. Circle the correct choice that gives the volume of the above region. You do not need to show work.

(a) 347.94
(b) 347.94π
(c) 547.94
(d) 547.94π
(e) 747.94

(7) Find the arc length of the function $f(x) = \sqrt{(9 - x^2)}$ from $x = 0$ to $x = 3$. Circle the correct choice that gives the arc length of the above function. You do not need to show work.

(a) π
(b) 1.5π
(c) 2.5π
(d) 3.5π
(e) 4.5π

(8) Consider the region bounded by $y = x^3$, $y = 2$, and the y-axis. Find the volume of the solid obtained by rotating the region around the y-axis. Circle the correct choice that gives the volume of the above region. You do not need to show work.

(a) 1.98
(b) 2.98
(c) 3.98
(d) 4.98
(e) 5.98

(9) Consider the region bounded by $y = x^2$, $y = 1$, and the y-axis. Find the volume of the solid obtained by rotating the region about the line $y = -6$. Circle the correct choice that gives the volume of the above region. You do not need to show work.

(a) 7.6
(b) 17.6
(c) 27.6
(d) 37.6
(e) 47.6

(10) Circle the correct answer that gives the fifth term of the sequence from the formula for s_n, $n \geq 1$.

$$s_n = \left(2 - \frac{1}{n+2}\right)^{n+3}$$

You do not need to show work.

(a) 7.72
(b) 16.4
(c) 34
(d) 69.6
(e) 142

(11) Circle the correct choice that gives a formula for s_n, $n \geq 1$.
4, 12, 28, 60, 124, $\cdots$
You do not need to show work.

(a) $s_n = (2^n - 1)$
(b) $s_n = 4(2^n + 1)$
(c) $s_n = 4(2^n - 1)$
(d) $s_n = 4(n^2 + 1)$
(e) $s_n = 4(n^2 - 1)$

(12) Does the sequence converge or diverge? If the sequence converges, find its limit.

$$s_n = \frac{(-0.75)^n}{n}$$

Circle the correct choice. You do not need to show work.

(a) Converges, Limit= -1.
(b) Converges, Limit= 0.
(c) Converges, Limit= 1.
(d) Converges, Limit= 2.
(e) Diverges.

(13) You are deciding whether to buy a new or two-year-old car (of the same make) based on which will have cost you less when you resell it at the end of three years. Your cost consists of two parts: the loss in value of the car and repairs. A new car costs 23000 dollars and loses 12 percent of its value each year. Repairs are 500 dollars the first year and increase by 19 percent each subsequent year. Find a formula for d_n, which gives the depreciation (loss of value) in dollars in year n. Circle the correct choice. You do not need to show work.

(a) $13000 \cdot 0.12 \cdot 0.88^n$
(b) $13000 \cdot 0.12 \cdot 0.88^{(n-1)}$
(c) $23000 \cdot 0.12 \cdot 0.88^n$
(d) $23000 \cdot 0.12 \cdot 0.88^{(n-1)}$
(e) $33000 \cdot 0.12 \cdot 0.88^n$