UNIVERSITY OF GHANA

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DEPARTMENT OF MATHEMATICS

MATH 223: CALCULUS II (3 credits)

EXERCISE 6 (Applications of Integration)

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1. Find the area of the region between the graphs of $y = x^2 + 2$ and $y = x - 1$ and the vertical lines $x = -1$ and $x = 2$.
2. Find the area bounded by the graphs of $y = 2 - x^2$ and $y = -x$.
3. Find the area of the region bounded by the graphs of $x = y^2$ and $y = x - 2$
   (a) by integrating with respect x
   (b) by integrating with respect y
4. Find the area of the region S bounded by the graph of $y = \cos x$ and $y = \left(\frac{2}{\pi}\right) x - 1$ and the vertical lines $x = 0$ and $x = \pi$.
5. Find the volume of the solid obtained by revolving the region under the graph of $y = \sqrt{x}$ on $[0, 2]$ about the x-axis.
6. By revolving the region under the graph $y = \sqrt{r^2 - x^2}$ on $[-r, r]$, show that the volume of a sphere of radius r is $V = \frac{4}{3}\pi r^3$.
7. Find the volume of the solid obtained by revolving the region bounded by the graph of $y = x^3$, $y = 8$ and $x = 0$ about the y-axis
8. Find the volume of the solid obtained by revolving the region bounded by $y = \sqrt{x}$ and $y = x$ about
   (a) the x-axis; the y-axis
   (b) the line $y = 2$
9. Find the length of the graph $f(x) = \dfrac{1}{3}x^3 + \dfrac{1}{4x}$ on the interval $[1, 3]$.
10. Find the arc length of the graph of $f(x) = \ln(2\cos x)$ between the adjacent points of the intersection of the graph with the x-axis.
11. Find the length of graph of $x = \dfrac{1}{3}y^3 + \dfrac{1}{4y}$ from $P\left(\dfrac{7}{12}, 1\right)$ to $Q\left(\dfrac{67}{24}, 2\right)$.
12. Use the dfifferentials to obtain an approximation of the arc length of graph of $y = 2x^2 + x$ from $P(1, 3)$ to $Q(1.1, 3.52)$
13. Find the area of the surface obtained by revolving the graph of $f(x) = \sqrt{x}$ on the interval $[0, 2]$ about the x-axis.
14. Find the area of the surface obtained by revolving the graph of $x = y^3$ on the interval $[0, 1]$ about the y-axis.