Name: _____

4-digit code: _____

- Write your name and the last 4 digits of your SSN in the space provided above.
- The test has six (6) pages, including this one.
- Enter your answer in the box(es) provided.
- You must show sufficient work to justify all answers unless otherwise stated in the problem. Correct answers with inconsistent work may not be given credit.
- Credit for each problem is given in parentheses at the right of the problem number.
- No books, notes or calculators may be used on this test.

Page	**Max. points**	**Your points**
2	20	
3	20	
4	20	
5	25	
6	15	
Total	100	

Problem 1 (10 pts)**.** Find the area of the region that is enclosed between the curves $y = x^2$ and $y = x + 6$.

$A =$ ☐

Problem 2 (10 pts)**.** Find the volume of the solid that is obtained when the region under the curve $y = \sqrt{x}$ over the interval $[1, 4]$ is revolved about the x-axis.

$V =$ ☐

Problem 3 (10 pts)**.** Find the volume of the solid generated when the region enclosed by $y = \sqrt{x}$, $y = 2$ and $x = 0$ is revolved about the y-axis.

$V =$ ____

Problem 4 (10 pts)**.** Find the arclength of the curve $y = x^{3/2}$ from $x = 1$ to $x = 2$.

$L =$ ____

Problem 5 (10 pts)**.** Find the area of the surface that is generated by revolving the portion of the curve $y = x^3$ between $x = 0$ and $x = 1$ about the x-axis.

$A =$ ____

Problem 6 (10 pts)**.** Find the average value of the function $f(x) = 1/x$ over the interval $[1, e]$.

$f_{ave} =$ ____

Problem 7 (15 pts)**.** Find a positive value of k such that the average value of $f(x) = \dfrac{1}{\sqrt{k^2 - x^2}}$ over the interval $[-k, k]$ is π.

You may find the following table useful:

angle θ	$-\frac{\pi}{2}$	$-\frac{\pi}{3}$	$-\frac{\pi}{4}$	$-\frac{\pi}{6}$	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
$\sin(\theta)$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1

$k =$

Problem 8 (10 pts)**.** Evaluate the integral $\displaystyle\int x^2\sqrt{x-1}\,dx$.

Problem 9 (15 pts)**.** A spring exerts a force of $4N$ when stretched 2 m beyond its natural length.

(a) How much work was performed in stretching the spring to this length?

$W =$ ____

(b) How far beyond its natural length can the spring be stretched with $36J$ of work?

$b =$ ____