• Write your name on every exam booklet that you use.
• Show all your work in your exam booklets.
• Circle your final answers and be sure that you have thoroughly explained them. Your answers do not need to be simplified.
• No calculators or books are permitted. Students are permitted to bring a single 8\(\frac{1}{2}\) \times 11 sheet of paper containing notes, formulas, etc.
• Please turn off cell phones.
• Good luck!

PROBLEMS ON REVERSE SIDE – DO NOT TURN OVER UNTIL INSTRUCTED
1. (a) What is the norm of the partition \( P = \{0, \pi/8, \pi/4, 3\pi/8, \pi/2\} \)?

(b) Use the partition \( P \) and some of the values from the following table to write down a Riemann sum approximation for \( \int_0^{\pi/2} \sin x \, dx \) (you don’t need to simplify it – you can leave it as a sum of fractions).

<table>
<thead>
<tr>
<th>( x )</th>
<th>( x/6 )</th>
<th>( x/4 )</th>
<th>( x/3 )</th>
<th>( x/2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \sin x )</td>
<td>0</td>
<td>( 1/2 )</td>
<td>( 1/\sqrt{2} )</td>
<td>( \sqrt{3}/2 )</td>
</tr>
</tbody>
</table>

2. Evaluate the following integrals.

(a) \( \int_{-2}^{2} (x^3 - 2x + 3) \, dx \)

(b) \( \int_{1}^{2} \sqrt{3x + 1} \, dx \)

(c) \( \int x^3 \cos(x^4 + 2) \, dx \)

3. How many subintervals are required to estimate \( \int_0^{\pi} \sin x \, dx \) to within an absolute error of 0.02 using

(a) the trapezoid rule

(b) Simpson’s rule.

4. Find the volume of the solid generated by rotating the region bounded by the curves \( y = \sqrt{x}, y = x \)

(a) about the \( x \)-axis

(b) about the line \( x = -1 \).

5. Find the length of the curve \( y = \int_0^x \sqrt{\cos 2t} \, dt \) from \( x = 0 \) to \( x = \pi/4 \).

6. Use the method of slicing to find the volume of the region in the first octant (i.e. \( x \geq 0, y \geq 0, z \geq 0 \)) which is bounded by the coordinate planes \( x = 0, y = 0, z = 0 \) and by the plane \( x + y + z = 1 \). (HINT: the region has 4 triangular faces and vertices at the points \( (0, 0, 0), (1, 0, 0), (0, 1, 0), (0, 0, 1) \).)