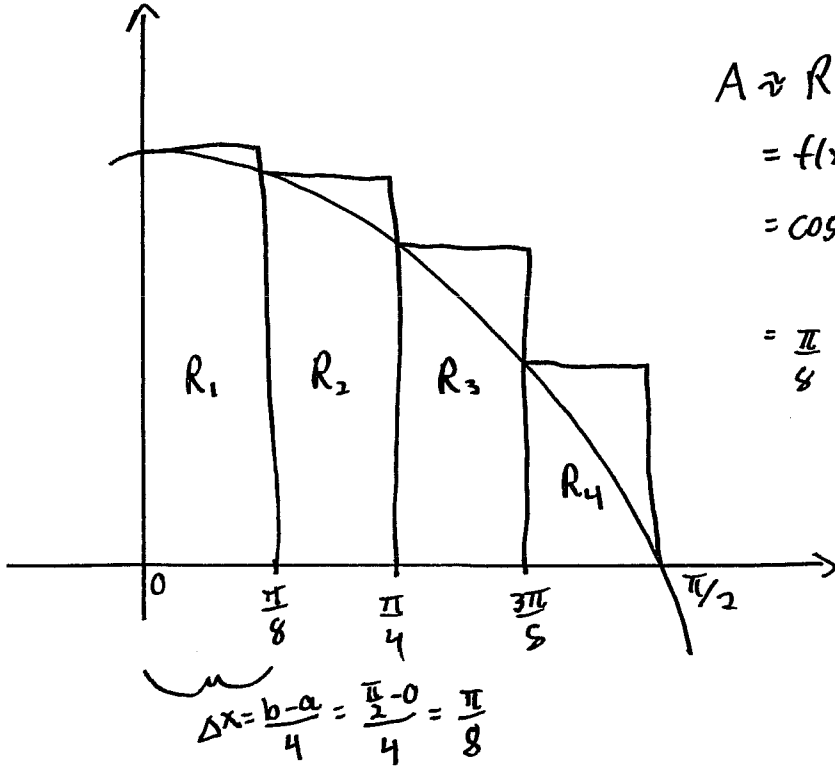


### Quiz 3

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

**Question 1.** (5 marks) §5.1 #3a Estimate the area under the graph of  $f(x) = \cos x$  from  $x = 0$  to  $x = \frac{\pi}{2}$  using four approximating rectangles and left endpoints. Sketch the graph and the rectangles. Is your estimate and underestimate or an overestimate?



$$\begin{aligned}
 A &\approx R_1 + R_2 + R_3 + R_4 \\
 &= f(x_0)\Delta x + f(x_1)\Delta x + f(x_2)\Delta x + f(x_3)\Delta x \\
 &= \cos 0 \frac{\pi}{8} + \cos \frac{\pi}{8} \frac{\pi}{8} + \cos \frac{\pi}{4} \frac{\pi}{8} + \cos \frac{3\pi}{8} \frac{\pi}{8} \\
 &= \frac{\pi}{8} \left[ 1 + \cos \frac{\pi}{8} + \frac{1}{\sqrt{2}} + \cos \frac{3\pi}{8} \right]
 \end{aligned}$$

overestimate

**Question 2.** (1 mark) §5.2 #16 Express the limit as a definite integral on the given interval

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n \frac{\cos x_i}{x_i} \Delta x, \quad [\pi, 2\pi] = \int_{\pi}^{2\pi} \frac{\cos x}{x} dx$$

**Question 3.** (1 mark) §5.2 #37 Evaluate  $\int_{\pi}^{\pi} \sin^2 x \cos^4 x dx = 0$

**Question 4.** (3 marks) §5.2 #40 If  $\int_1^5 f(x) dx = 12$  and  $\int_4^5 f(x) dx = 3.6$ , find  $\int_1^4 f(x) dx$ .

$$\int_1^5 f(x) dx = \int_1^4 f(x) dx + \int_4^5 f(x) dx$$

$$12 = \int_1^4 f(x) dx + 3.6$$

$$\int_1^4 f(x) dx = 8.4$$