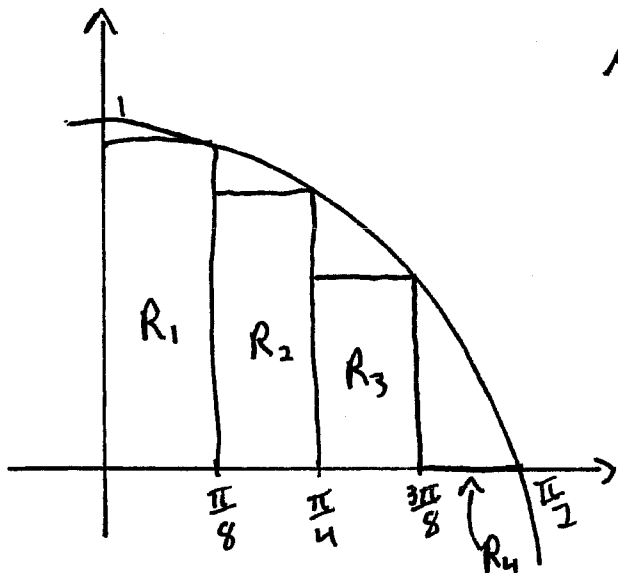


Quiz 3

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 right endpoints. Sketch the graph and the rectangles. Is your estimate and underestimate or an overestimate?



$$A \approx R_1 + R_2 + R_3 + R_4$$

$$= f(x_1)\Delta x + f(x_2)\Delta x + f(x_3)\Delta x + f(x_4)\Delta x$$

$$= \cos\left(\frac{\pi}{8}\right)\frac{\pi}{8} + \cos\left(\frac{\pi}{4}\right)\frac{\pi}{8} + \cos\left(\frac{3\pi}{8}\right)\frac{\pi}{8} + \cos\left(\frac{\pi}{2}\right)\frac{\pi}{8}$$

$$= \frac{\pi}{8} \left[\cos\left(\frac{\pi}{8}\right) + \frac{1}{\sqrt{2}} + \cos\left(\frac{3\pi}{8}\right) + 0 \right]$$

underestimate

$$\Delta x = \frac{\frac{\pi}{2} - 0}{4} = \frac{\pi}{8}$$

Question 2. (1 mark) §5.2 #15 Express the limit as a definite integral on the given interval

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n x_i \ln(1+x_i^2) \Delta x, \quad [2, 6] = \int_2^6 x \ln(1+x^2) dx$$

Question 3. (1 mark) §5.2 #38 Given that $\int_0^1 3x\sqrt{x^2+4} dx = 5\sqrt{5} - 8$, what is $\int_1^0 3u\sqrt{u^2+4} du$? $\int_1^0 3u\sqrt{u^2+4} du = 8 - 5\sqrt{5}$

Question 4. (3 marks) §5.2 #41 If $\int_0^9 f(x) dx = 37$ and $\int_0^9 g(x) dx = 16$, find $\int_0^9 [2f(x) + 3g(x)] dx$.

$$= \int_0^9 2f(x) dx + \int_0^9 3g(x) dx$$

$$= 2 \int_0^9 f(x) dx + 3 \int_0^9 g(x) dx$$

$$= 2(37) + 3(16) = 122$$