ArtSci 1D06 Calculus 2017–2018

Practice questions for Fall Midterm 2

This is a list of practice questions in order to prepare for Midterm 2. It represents the difficulty, but not the length, of the actual exam.

1)

a) Find $\lim_{x\to 2} \dfrac{x-2}{x^2-4}$.

b) Find $\displaystyle\int 4(2x+5)e^{x^2+5x}\,dx$.

c) Find $\displaystyle\int \frac{x}{\sqrt{1-7x^2}}\,dx$.

2) Sketch the region and find the area bounded by the curves $y = xe^{-x^2}$, $y = 2x + 2$, $x = 1$ and the y-axis.

3) Find the volume of the solid obtained by rotating the region bounded by the curve $y = 2\sqrt{x+1}$ and the line $x = 2$ around the x-axis.

4) Find the area bounded by the graph of $y = 5\sin(x)$ from $x = 0$ to $x = 3\pi$. (Hint: sketch the curve.)

5) Estimate the area under the graph of $y = 3x + 2$ from $x = 2$ to $x = 4$ using a right Riemann sum with 40 intervals. (You may use the fact that $\displaystyle\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$).

6)

a) State both parts of the Fundamental Theorem of Calculus.

b) If $g'(x) = 2e^{-x} + 1$, find the difference between $g(2)$ and $g(1)$.

7) Let x and y be two positive numbers such that $x + 2y = 50$. What is the largest value that $(x + 1)(y + 2)$ can have?

8) Consider the function $f(x) = \dfrac{x}{x^2+1}$.

a) Find $\lim_{x\to-\infty} \dfrac{x}{x^2+1}$ and $\lim_{x\to\infty} \dfrac{x}{x^2+1}$.

b) Find the local maximum of f. Justify.

c) Find the local minimum of f. Justify.

d) Sketch the graph of $y = f(x)$.