

Review Sheet / Exam 1 - Calculus II

1. Integrate: a) $\int x^2 \sqrt{x^3+5} dx$ b) $\int \cos^3(5x) \sin(5x) dx$
 c) $\int_0^2 \frac{1}{(3x+2)^3} dx$ d) $\int [\sin(\sin \theta)] \cos \theta d\theta$ e) $\int \frac{t^4+3}{t} dt$

2. a) Find the average value of $f(x) = \sin 2x$ over $[0, \pi/2]$.
 b) Let $f(x) = \sqrt{x}$. Find the value c guaranteed by the MVT for Integrals for f over $[0, 3]$.

3. a) Find the arc length of $x = 1 - \sin t$, $y = \cos t - 1$, $0 \leq t \leq \pi$.
 b) Find the arc length of $y = x^{3/2}$ from $(0, 0)$ to $(4, 8)$.

4. Find the volume of the solid whose base in the xy -plane is bounded by $y = e^x$, $x = 0$, and the x -axis, and whose cross-sections perpendicular to the x -axis are squares.

5. Using the definition, determine if the improper integrals converge or diverge. Evaluate it if it is convergent.

a) $\int_0^{\pi/2} \sec^2 x dx$ b) $\int_{-1}^{\infty} \frac{dx}{1+x^2}$ c) $\int_0^5 \frac{dx}{(x-1)^{4/5}}$ d) $\int_{-\infty}^{\infty} \frac{e^x}{1+e^{2x}} dx$

6. Evaluate: a) $\lim_{x \rightarrow 0} \left(\frac{1}{x^2} - \frac{\cos 3x}{x^2} \right)$ b) $\lim_{x \rightarrow +\infty} (1+x^2)^{1/\ln x}$

7. Find the volume of the solids obtained by revolving the region enclosed by $y = x$ and $y = x^2$ about the following lines:

a) the x -axis b) the y -axis c) $y = 2$

8. #6, p479 (Text)

9. Find the slope of the tangent line of the parametric curve C at the point where $t = \pi/4$

$$C: \begin{cases} x = 1 - \sin t \\ y = \cos t - 1 \end{cases}$$