

Calculus 2 Final Exam Review

Find the integral of each of the following problems 1 – 5:

1)  $\int_0^1 \frac{3x}{(2x+1)^3} dx$

2)  $\int 3x \sin(x) \cos(x) dx$

3)  $\int \frac{2x-3}{x^3+3x} dx$

4)  $\int_0^{\frac{\pi}{4}} \tan^3(\theta) \sec^2(\theta) d\theta$

5)  $\int \frac{1}{x\sqrt{4x+49}} dx$

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- 6) Find the volume of the solid obtained by rotating the region bound by the following curves around the  $x$ -axis:

$$y = \sqrt{x-1}, y = 0, x = 6$$

- 7) Find the volume of the solid obtained by rotating the region bound by the following curves around the  $y$ -axis:

$$y = 9e^{-x^2}, y = 0, x = 0, x = 1$$

- 8) Find the exact length of the curve:

$$x = \frac{1}{3}\sqrt{y}(y-3), 16 \leq y \leq 25$$

- 9) Find the exact area of the surface obtained by rotating the curve about the  $x$ -axis:

$$y = \cos\left(\frac{1}{6}x\right), 0 \leq x \leq 3\pi$$

- 10) A hot, wet summer is causing a mosquito population explosion in a lake resort area. The number of mosquitos is increasing at an estimated rate of  $n(t) = 1500 + 10e^{0.9t}$  per week. By how much does the mosquito population increase between the fifth and ninth weeks of summer?

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For each of the following series determine if they converge or diverge 11-13:

11)  $\sum_{n=0}^{\infty} (-1)^n \frac{\pi^{4n}}{(2n)!}$

12)  $\sum_{n=1}^{\infty} \frac{\sin(7n)}{1+2^n}$

13)  $\sum_{n=1}^{\infty} \frac{n \ln(n)}{(n+4)^3}$

14) Find the radius and interval of convergence for the following series:

$$\sum_{n=1}^{\infty} \frac{(-1)^n 3^n}{\sqrt{n}} x^n$$

15) Evaluate the following integral using a power series:

$$\int \frac{\cos(x) - 1}{x} dx$$