

20B Practice Exam Summer 2009

(1) Integrate:

$$\int \frac{x^3 - 2x^2 - 9x + 9}{x^4 + 9x^2} dx$$

(2) Integrate:

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

(3) Use any method to determine whether the following infinite sums converge or diverge:

(a)

$$\sum_{n=1}^{\infty} \frac{\tan^{-1} n}{n}$$

(b)

$$\sum_{n=1}^{\infty} \frac{n^2}{n^2 + 1}$$

(c)

$$\sum_{n=2}^{\infty} \frac{1 + 2n}{n^2 - 1}$$

(4) Find the 6 solutions to $x^6 + 1 = 0$. Write your solutions in the form $a + ib$.

(5) Express the following expression as a Taylor series centered at 2 and find the interval of convergence:

$$\frac{1}{3 - x}$$

(6) Express the following expression as a Taylor series centered at 0 and find the interval of convergence:

$$\frac{\sin x - x}{x^3}$$

(7) Solve the following initial value problem:

$$y' = \frac{xy^2}{1 + x^2}, y(0) = -2$$

(8) Find the area enclosed by the shaded region of the function $r = 1 - \sin 2\theta$

