Math 232 Calculus 2 Spring 15 Sample Final

(1) Find the following integrals.

    (a) $\displaystyle\int_0^\infty xe^{-2x^2}\ dx.$

    (b) $\displaystyle\int_0^\infty xe^{-2x}\ dx.$

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

    (d) $\displaystyle\int \sin 2x \cos 3x\ dx.$

(2) Find the degree three Taylor polynomial centered at $x = 1$ for the function $f(x) = \ln(1 + x^2)$.

(3) Find the volume of revolution obtained by rotating the curve $y = e^{-3x}$ around the x-axis on the interval $[0, \infty)$.

(4) Computer the power series for $f(x) = x^2 e^{-x^2}$ centered at $x = 0$. What is the radius of convergence?

(5) Draw the polar coordinate graph $r = 2 + \sin(\theta)$. Write down an expression for the area under curve, but do not evaluate it. Find the slope of the tangent line when $\theta = -\pi/4$.

(6) Find the following integrals

    (a) $\displaystyle\int \frac{x^2 + 2}{x}\ dx.$

    (b) $\displaystyle\int \frac{x^2 + 1}{x + 2}\ dx.$

    (c) $\displaystyle\int \frac{x}{2x^2 + 3}\ dx.$

    (d) $\displaystyle\int \frac{1}{1 + 2x^2}\ dx.$

(7) Explain whether the following series converge or diverge, indicating clearly which tests you use.

(a) $\displaystyle\sum_{n=0}^{\infty} \left(\frac{-\sqrt{2}}{e}\right)^n.$

(b) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{2+n^2}.$

(c) $\displaystyle\sum_{n=0}^{\infty} \frac{(-1)^n}{2+n^2}.$

(d) $\displaystyle\sum_{n=0}^{\infty} \frac{10^n}{n!}.$

(8) Consider the sequence $a_n = \left(2 - \frac{1}{n+1}\right).$

(a) Does the sequence $\{a_n\}$ converge? Explain.

(b) Does the series $\displaystyle\sum_{n=0}^{\infty}$ converge? Explain.