Math 132.5. Worksheet 4

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(1) S07Q1b Starting with the Maclaurin series for e^x, find a power series expansion for xe^{-x^2}.

(2) S18Q2 What function does the power series $\sum_{n=0}^{\infty}(-1)^n \frac{x^n}{5^{n+1}}$ represent?

(3) S07Q7. Express $\frac{1}{1+x^3}$ as a power series in x. Use your answer to compute the indefinite integral $\int \frac{1}{1+x^3}dx$ (either use summation notation or give at least the first 5 terms of the series).

(4) S17Q3 Given that the Maclaurin series for $\sin x$ is $\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n+1}}{(2n+1)!}$, find the Maclaurin series for $f(x) = \frac{\sin(5x)}{x}$.

(5) F16Q8a Find the power series expansion for $f(x) = \ln(1+3x^2)$ centered at $x = 0$. Express your final answer in summation notation and simplify completely.

(6) S08Q6 Starting with the Maclaurin series expansion of e^x, express the function e^{-x^2} as a power series (use summation notation). Use your answer to compute the indefinite integral $\int \frac{e^{-x^2}-1}{x}dx$ as a power series.

(7) F17Q7b Find the Taylor series for $f(x) = \frac{1}{x}$ centered at $x = 3$. Express your final answer in summation notation and simplify completely.

(8) S17Q7b Find the power series expansion for $f(x) = \frac{2x^3}{3+9x^9}$ centered at $x = 0$, and use the power series to evaluate the indefinite integral $\int \frac{2x^3}{3+9x^9}dx$.

(9) F16Q8b Find the Taylor series for $f(x) = \frac{1}{x^2}$ centered at $x = 7$. Express your final answer in summation notation and simplify completely.

(10) F06Q8 Given that the Maclaurin series for $\sin x$ is $\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n+1}}{(2n+1)!}$, find the Maclaurin series for $g(x) = \sin(x^2)$. Use your answer to compute the indefinite integral $\int \sin(x^2)dx$ as a power series (use summation notation).

(11) F06Q6b Find the coefficient of x^4 in the Taylor series for $\ln(\cos x)$ about $x = 0$.