Credit is given only if you choose the correct answer *and* show supporting work.

1. What is the precise interval of convergence of the following power series,

$$\sum_{n=1}^{\infty} \frac{(2x+1)^n}{n \cdot 2^{n+3}}.$$

A) $(-3, 1]$ B) $[-3, 1)$ C) $(-2, 2]$ D) $[-2, 2)$ E) $(-1\frac{1}{2}, \frac{1}{2}]$ F) $[-1\frac{1}{2}, \frac{1}{2})$

2. Determine the beginning of the power series of the function

$$f(x) = \frac{x}{x^2+2} + \frac{1}{x+1}.$$

A) $\frac{1}{3}x^3 + \frac{1}{10}x^5 + \frac{1}{21}x^7 + \frac{1}{36}x^9 \cdots$

B) $\frac{1}{3}x^3 - \frac{1}{10}x^5 + \frac{1}{21}x^7 - \frac{1}{36}x^9 \cdots$

C) $\frac{1}{2}x^2 + \frac{1}{4}x^4 + \frac{1}{8}x^6 + \frac{1}{16}x^8 \cdots$

D) $\frac{1}{2}x^2 - \frac{1}{4}x^4 + \frac{1}{8}x^6 - \frac{1}{16}x^8 \cdots$

E) $1 + \frac{1}{2}x + x^2 + \frac{5}{4}x^3 \cdots$

F) $1 - \frac{1}{2}x + x^2 - \frac{5}{4}x^3 \cdots$

3. Let $F(x)$ be the function defined by the integral

$$F(x) = \int_0^x \ln(t^2+1)\,dt.$$

What is the beginning of the MacLaurin series for the function $F(x)$?

A) $\frac{1}{3}x^3 + \frac{1}{10}x^5 + \frac{1}{21}x^7 + \frac{1}{36}x^9 \cdots$

B) $\frac{1}{3}x^3 - \frac{1}{10}x^5 + \frac{1}{21}x^7 - \frac{1}{36}x^9 \cdots$

C) $\frac{1}{2}x^2 + \frac{1}{4}x^4 + \frac{1}{8}x^6 + \frac{1}{16}x^8 \cdots$

D) $\frac{1}{2}x^2 - \frac{1}{4}x^4 + \frac{1}{8}x^6 - \frac{1}{16}x^8 \cdots$

E) $1 + \frac{1}{2}x + x^2 + \frac{5}{4}x^3 \cdots$

F) $1 - \frac{1}{2}x + x^2 - \frac{5}{4}x^3 \cdots$