1. (1 pt) Find all the values of x such that the given series would converge.

$$\sum_{n=1}^{\infty} \frac{(5x)^n}{n^4}$$

The series is convergent
from $x =$ ___, left end included (enter Y or N): ___
to $x =$ ___, right end included (enter Y or N): ___

2. (1 pt) Find all the values of x such that the given series would converge.

$$\sum_{n=1}^{\infty} \frac{(x-2)^n}{n^n}$$

Answer: __________
Note: Give your answer in **interval notation**

3. (1 pt) Find all the values of x such that the given series would converge.

$$\sum_{n=1}^{\infty} \frac{(5x-9)^n}{n^2}$$

Answer: __________
Note: Give your answer in **interval notation**

4. (1 pt) The function $f(x) = \ln(1-x^2)$ is represented as a power series
$f(x) = \sum_{n=0}^{\infty} c_n x^n$.
Find the FOLLOWING coefficients in the power series.
$c_0 =$ __________
$c_1 =$ __________
$c_2 =$ __________
$c_3 =$ __________
$c_4 =$ __________
Find the radius of convergence R of the series.
$R =$ __________ .

5. (1 pt) Suppose that

$$\frac{5x}{x+11} = \sum_{n=0}^{\infty} c_n x^n.$$

Find the following coefficients.
$c_0 =$ __________
$c_1 =$ __________
$c_2 =$ __________
$c_3 =$ __________
$c_4 =$ __________
Find the radius of convergence R of the power series.
$R =$ __________

6. (1 pt) (a)
Evaluate the integral
$\int_0^2 \frac{24}{x^2+4} dx.$
Your answer should be in the form $k\pi$, where k is an integer. What is the value of k?
Hint: $\frac{d \arctan(x)}{dx} = \frac{1}{x^2+1}$
$k =$ __________
(b)
Now, lets evaluate the same integral using power series. First, find the power series for the function $f(x) = \frac{24}{x^2+4}$. Then, integrate it from 0 to 2, and call it S. S should be an infinite series. What are the first few terms of S ?
$a_0 =$ __________
$a_1 =$ __________
$a_2 =$ __________
$a_3 =$ __________
$a_4 =$ __________
(c) The answers to part (a) and (b) are equal (why?). Hence, if you divide your infinite series from (b) by k (the answer to (a)), you have found an estimate for the value of π in terms of an infinite series. Approximate the value of π by the first 5 terms.
__________ .
(d)
What is the upper bound for your error of your estimate if you use the first 11 terms? (Use the alternating series estimation.)
__________ .