8. [8 points] Consider the power series

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

In the following questions, you need to support your answers by stating and properly justifying the use of the test(s) or facts you used to prove the convergence or divergence of the series. Show all your work.

a. [2 points] Does the series converge or diverge at $x = 3$?

b. [2 points] What does your answer from part (**a**) imply about the radius of convergence of the series?

c. [4 points] Find the interval of convergence of the power series.