

For 1 - 8 compute the Taylor series for the following functions using the Taylor series definition. Assume the series is centered at  $x = 0$  unless otherwise specified. Compute the radius of convergence as well.

1.  $f(x) = \ln x, a = 2$

2.  $f(x) = \cos x, a = \pi/2$

3.  $f(x) = e^x + e^{2x}$

4.  $f(x) = e^{2x}, a = 3$

5.  $f(x) = \sqrt{x}, a = 4$

6.  $f(x) = \sinh x$

7.  $f(x) = (1 - x)^{-2}$

8.  $f(x) = x^5 + 2x^3 + x, a = 2$

9. What is  $f^{(37)}(0)$  (the 37-th derivative of  $f$ ) where  $f(x) = \sqrt{(1+x)^5}$ .

10. What is  $f^{(25)}(\pi)$  where  $f(x) = \cos x$ .

11. What is  $f^{(20)}(2)$  where  $f(x) = \ln x$ .

12. What is  $f^{(56)}(3)$  where  $f(x) = e^{2x}$ .