M251 Practice Exam 6 9.6-9.10
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1. Find a first-degree polynomial function P_1 whose value and slope agree with the value and slope of f at $x = c$. What is P_1 called?

$$f(x) = \frac{2}{\sqrt{x}}, c = 9$$

2. Find a first-degree polynomial function P_1 whose value and slope agree with the value and slope of f at $x = c$. What is P_1 called?

$$f(x) = \tan x, c = -\frac{\pi}{6}$$

3. Find the Maclaurin polynomial of degree 3 for the function.

$$f(x) = e^{-3x}$$

4. Find the Maclaurin polynomial of degree 4 for the function.

$$f(x) = e^{11x}$$

5. Find the Maclaurin polynomial of degree 5 for the function.

$f(x) = \sin(3x)$

6. Find the Maclaurin polynomial of degree 4 for the function.

$f(x) = \cos(x)$

7. Find the fourth degree Maclaurin polynomial for the function.

$f(x) = \dfrac{1}{x+6}$

8. Find the third degree Taylor polynomial centered at $c = 1$ for the function.

$f(x) = \sqrt[4]{x}$

9. Find the fourth degree Taylor polynomial centered at $c = 2$ for the function.

$f(x) = \ln x$

10. Find the radius of convergence of the power series.

$$\sum_{n=0}^{\infty} \frac{(-1)^n x^n}{10^n}$$

11. Find the radius of convergence of the power series.

$$\sum_{n=0}^{\infty} \frac{(4x)^{2n}}{(2n)!}$$

12. Find the interval of convergence of the power series. (Be sure to include a check for convergence at the endpoints of the interval.)

$$\sum_{n=0}^{\infty} \left(\frac{x}{7}\right)^n$$

13. Find the interval of convergence of the power series. (Be sure to include a check for convergence at the endpoints of the interval.)

$$\sum_{n=0}^{\infty} \frac{(6x)^n}{(6n)!}$$

14. Find the interval of convergence of the power series. (Be sure to include a check for convergence at the endpoints of the interval.)

$$\sum_{n=0}^{\infty} \frac{(-1)^n n!(x-7)^n}{5^n}$$

15. Find the interval of convergence of the power series. (Be sure to include a check for convergence at the endpoints of the interval.)

$$\sum_{n=1}^{\infty} \frac{(x-10)^{n-1}}{10^{n-1}}$$

16. Find the interval of convergence of (i) $f(x)$, (ii) $f'(x)$, (iii) $f''(x)$, and (iv) $\int f(x)dx$ of the power series. (Be sure to include a check for convergence at the endpoints of the interval.)

$$f(x) = \sum_{n=0}^{\infty} \left(\frac{x}{3}\right)^n$$

17. Find the interval of convergence of (i) $f(x)$, (ii) $f'(x)$, (iii) $f''(x)$, and (iv) $\int f(x)dx$ of the power series. (Be sure to include a check for convergence at the endpoints of the interval.)

$$f(x) = \sum_{n=1}^{\infty} \frac{(-1)^{n+1}(x-7)^n}{n}$$

18. Find a geometric power series for the function centered at 0, (i) by the technique shown in Examples 1 and 2 and (ii) by long division.

$$f(x) = \frac{6}{8-x}$$

19. Find a power series for the function, centered at c, and determine the interval of convergence.

$$f(x) = \frac{2}{4+x},\ c = 10$$

20. Use the power series

$$\frac{1}{1+x} = \sum_{n=0}^{\infty} (-1)^n x^n$$

to determine a power series, centered at 0, for the function. Identify the interval of convergence.

$$h(x) = \frac{-12}{x^2 - 1}$$

21. Use the power series

$$\frac{1}{1+x} = \sum_{n=0}^{\infty} (-1)^n x^n$$

to determine a power series, centered at 0, for the function. Identify the interval of convergence.

$$f(x) = \frac{10}{(x+10)^3} = \frac{d^2}{dx^2}\left(\frac{5}{x+10}\right)$$

22. Use the power series

$$\frac{1}{1+x} = \sum_{n=0}^{\infty} (-1)^n x^n$$

to determine a power series, centered at 0, for the function. Identify the interval of convergence.

$$f(x) = \frac{1}{4x^2+1}$$

23. Find the Taylor series (centered at *c*) for the function.

$$f(x) = e^{10x},\ c = 0$$

24. Find the Taylor series (centered at c) for the function.

$$f(x) = \sin(x), c = \frac{\pi}{4}$$

25. Find the Taylor series (centered at c) for the function.

$$f(x) = \ln\left(x^6\right), c = 1$$

26. Use the binomial series to find the Maclaurin series for the function.

$$f(x) = \frac{1}{\sqrt[10]{1-x}}$$

27. Use the binomial series to find the Maclaurin series for the function.

$$f(x) = \sqrt{1+x^4}$$