

10. [9 points] For each of the following, circle all correct answers. No justification is necessary.

a. [3 points] The series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}((2x)^{n+1})}{n}$ is a Taylor series centered at $x = 0$ for some function $q(x)$. Which of the following statements are true?

- i. The series diverges at $x = \frac{1}{2}$.
- ii. The series diverges at $x = \frac{-1}{2}$.
- iii. $q(x)$ could be $2x \ln(1 + 2x)$.
- iv. $q(x)$ could be $\ln(1 + 2x)$.
- v. The series converges to $6 \ln(1 + 6)$ at $x = 3$.
- vi. The series converges to $\ln(1 + 6)$ at $x = 3$.
- vii. NONE OF THESE

b. [3 points] Let $f(x)$ be a continuous, differentiable function, with $f(1) = 1$, $f'(1) = 2$. Which of the following must be an antiderivative of $f'(f(x))f'(x)$ that passes through $(1, 3)$?

- i. $f(f(x)) + 2$
- ii. $f'(f(x)) + 1$
- iii. $\frac{1}{2}(f(x))^2 + \frac{5}{2}$
- iv. $3 + \int_0^{x-1} f'(f(t))f'(t)dt$
- v. $\int_1^x f'(f(t))f'(t)dt$
- vi. $3 + \int_0^{x-1} f'(f(t+1))f'(t+1)dt$
- vii. $3 + \int_1^x f'(f(t))f'(t)dt$
- viii. NONE OF THESE

c. [3 points] Which of the following functions are solutions to the differential equation $\frac{d^2y}{dx^2} + 4y = 0$?

- i. $y = 4 \cos(x)$
- ii. $y = \cos(2x)$
- iii. $y = \cos(2x) + 4$
- iv. $y = 4 \cos(2x)$
- v. $y = e^{2x}$
- vi. $y = e^{-2x}$
- vii. NONE OF THESE