

9. [12 points] Read the following parts carefully, and circle the appropriate answer(s). Some parts may have more than one correct answer.

a. [3 points] Circle the value(s) of  $x$  for which the following identity holds:

$$2 = x^3 + \frac{x^6}{2!} + \frac{x^9}{3!} + \frac{x^{12}}{4!} + \cdots$$

$$\sqrt[3]{\ln(2)}$$

$$\sqrt[3]{\ln(3)}$$

$$(\ln(2))^3$$

$$e^{2^3}$$

$$\ln(\sqrt[3]{3})$$

$$e^{\sqrt[3]{3}}$$

- b. [3 points] Raymond Green's pet anaconda Sheela grew 5 m in length over the past month. The veterinarian says that each month, the increase in Sheela's length will be 40% of the increase the month before. How much longer (in meters) will Sheela be one year from now? Circle **all** that apply.

$$\sum_{k=0}^{12} 5(0.4)^k$$

$$\frac{2(1 - (0.4)^{12})}{1 - 0.4}$$

$$\sum_{k=1}^{12} 5(0.4)^k$$

$$\frac{5(1 - (0.4)^{12})}{1 - 0.4}$$

$$\frac{2(1 - (0.4)^{13})}{1 - 0.4}$$

- c. [3 points] Let  $\alpha > 0$  be a constant. What is the value of the convergent series  $\sum_{n=1}^{\infty} \frac{(-1)^{n+1} \alpha^n}{(2n)!}$  ?

$$\cos(\alpha) - 1$$

$$\cos(\sqrt{\alpha}) - 1$$

$$1 - \cos(\alpha)$$

$$\alpha - \cos(\sqrt{\alpha})$$

$$1 - \cos(\sqrt{\alpha})$$

$$\cos(\alpha) - \alpha$$

- d. [3 points] Which of the following series converge **absolutely**? Circle **all** that apply.

$$\sum_{n=1}^{\infty} \frac{\sin^{99}(n)}{n^2}$$

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

$$\sum_{n=2}^{\infty} \frac{8^n + (-1)^n 10^n}{9^n}$$

$$\sum_{n=2}^{\infty} \frac{(-1)^{n+1}}{n(\ln(n))^{1.01}}$$

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