1. [10 points] Compute the **exact value** of each of the following. If a value **diverges, or otherwise does not exist**, write DNE. If there is **not enough information** to determine a given value, write NEI. You do not need to justify or simplify your answers.

a. [2 points] Find the value of p so that $\int_0^{10} \frac{1}{x^{2p}}\,dx$ and $\int_3^\infty \frac{1}{x^{2p}}\,dx$ both diverge.

Answer: $p =$ _____

b. [2 points] Recall that a normal distribution has a probability density function (pdf) of the form

$$p(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(x-\mu)^2/2\sigma^2},$$

where μ is the mean of the distribution and σ is the standard deviation, with $\sigma > 0$. Find the exact value of

$$\int_{-\infty}^\infty \frac{1}{\sqrt{2\pi}} e^{-(x-5)^2/18}\,dx.$$

Answer: _____

c. [2 points] Evaluate $\int_{-17}^{17} \frac{1}{x^2}\,dx$.

Answer: _____

d. [2 points] Find the exact value of the infinite sum $5 + \frac{10}{3} + \frac{20}{9} + \frac{40}{27} + \cdots$.

Answer: _____

e. [2 points] Let $q(x)$ be a probability density function (pdf) for a statistic with mean value 5. Find the exact value of $\int_{-\infty}^\infty (1+x)q(x)\,dx$.

Answer: _____