

Midterm 2

Time: 50min

1. Find

a) $\int \ln(x) dx$

b) $\int_{-1}^3 \frac{1}{x^5} dx$

c) $\int \sqrt{4-x^2} dx$

d) $\int \frac{x^3}{x^2+x-2} dx$

2. Find

a) $\lim_{x \rightarrow 0} (\sin x)^{\frac{1}{x}}$

b) $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$

3. Determine whether or not the following series converge:

a) $\sum_{k=2}^{\infty} \frac{2}{k-1}$

b) $\sum_{k=1}^{\infty} \left(\frac{\pi}{e}\right)^k$

c) $\frac{\ln(2)}{2} + \frac{\ln(3)}{3} + \frac{\ln(4)}{4} + \dots$

d) $\sum_{k=1}^{\infty} \frac{e^n}{n^{100}}$

4. Express $3.199999\dots$ as the ratio of two integers.

1 and 3 are worth 40 points each, and 2 and 4 are 10 points each.