Mathematics 131
Homework 8
4/24/17

1, 2, 3

(1) Use Taylor's Theorem to prove that $1 - \frac{1}{2}x^2 \leq \cos x$ for all $x \in \mathbb{R}$

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(2) Use Taylor's Theorem to prove that for any positive integer k for all $x > 0$,

$$x - \frac{1}{2}x^2 + \cdots - \frac{1}{2k}x^{2k} < \ln(1+x) < x - \frac{1}{2}x^2 + \cdots + \frac{1}{2k+1}x^{2k+1}$$

■

(3) Prove that $e^\pi > \pi^e$. Hint: Use Taylor's Theorem to prove that $e^x > 1 + x$ when $x > 0$. Then find a way to use the fact that $\pi/e > 1$.

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