Math 10A
Homework #8; Due Thursday, 7/19/2018
Instructor: Roy Zhao

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1. True False The value of a convergent two sided improper integral $\int_{-\infty}^{\infty} f(x)dx$ depends on where we split the integral as a sum of one sided integrals $\int_{-\infty}^{a} f(x)dx + \int_{a}^{\infty} f(x)dx$.

2. True False For any odd function, we have $\int_{-\infty}^{\infty} f(x)dx = 0$.

3. True False If $0 \leq f(x) \leq g(x)$, then $\int_{1}^{\infty} \frac{1}{g(x)}dx \leq \int_{1}^{\infty} \frac{1}{f(x)}dx$.

4. Find the following integrals or say how they diverge:
   (a) $\int_{5}^{\infty} \frac{1}{x^3}dx$.
   (b) $\int_{0}^{\infty} e^{-x}dx$
   (c) $\int_{\pi}^{\infty} \cos(x)dx$.
   (d) $\int_{-\infty}^{1} \frac{1}{x}dx$.
   (e) $\int_{-\infty}^{\infty} \frac{1}{1+x^2}dx$.

5. Use the comparison test to determine whether $\int_{0}^{\infty} \frac{1}{1+e^x}dx$ converges.

6. True False To use partial fractions, we write $\frac{x^2}{(x-1)(x+1)}$ as $\frac{A}{x-1} + \frac{B}{x+1}$.

7. Use partial fractions to calculate each integral:
   (a) $\int \frac{10}{(x+1)(x^2-1)}dx$.
   (b) $\int \frac{2x+1}{x^2-5x+6}dx$.
   (c) $\int \frac{x-1}{x^2+2x+1}dx$.

8. Set up the partial fractions decomposition of $\frac{1}{(x^2-1)(x^2+1)^2}$. You do not need to solve for the coefficients.