

Phys 208 – Theoretical Physics – Test 1 (February 10, 2012)

1.(17 pts) Consider the binomial series $(1+x)^{-3/2} = \sum_{n=0}^{\infty} \binom{-\frac{3}{2}}{n} x^n$. Evaluate the binomial coefficient $\binom{-\frac{3}{2}}{n}$ to obtain the general form for the series in terms of factorials, double

factorials, etc. Recall: $\binom{p}{0} = 1$ $\binom{p}{1} = p$ $\binom{p}{n} = \frac{p(p-1)(p-2)\cdots(p-n+1)}{n!}$

2.(17 pts) Test the following complex series for convergence: $\sum_{n=0}^{\infty} \left(\frac{2+i}{3-4i} \right)^{2n}$.

3.(15 pts) Evaluate the following complex function: $\cos(\pi - 2i \ln 3)$.

4.(17 pts) Evaluate the following complex function: $\sin^{-1} \left[\left(\frac{\sqrt{3}+i}{\sqrt{3}-i} \right)^{12} \right]$.

5.(17 pts) Determine the roots of $i^{2/3}$. You can leave your results in polar form, but give a sketch (or plot) of your results.

6.(17 pts) Evaluate the sum $\sum_{n=0}^{\infty} x^n \cos(nx)$ for $0 < x < 1$.