

Due in Session #28 by 3 pm:

- (1) Derive a reduction formula (express I_n in terms of I_{n-1}) for

$$I_n = \int \frac{dx}{(x^2 + a^2)^n}.$$

- (2) Evaluate

$$\lim_{x \rightarrow 0} \frac{\sin(x) - xe^{(x^2)} + 7/6x^3}{(\sin(x))^2 \sin(x^3)}.$$

- (3) Fix $a > 0$ and let $|x| \ll a$. Show that up to terms of order $(\frac{x}{a})^2$, we have:

$$e^{\frac{x}{a}} \simeq \sqrt{\frac{a+x}{a-x}}.$$