Math 182 Honors Quiz 10 Version A

1. Consider the formula

$$\arctan x = x - \frac{x^3}{3} + \frac{x^5}{5} - \cdots + (-1)^{n-1}\frac{x^{2n-1}}{2n-1} + (-1)^n \int_0^x \frac{t^{2n}}{1+t^2}dt.$$

(i) Let r be the positive solution to $11x = 12\arctan x$. Use the cubic Taylor polynomial approximation of $\arctan x$ to approximate r.

(ii) Use the formula given above to bound $|11x - 12\arctan x|$ where x is the approximation of r found in part (i).

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2. Find the function $y = y(x)$ that satisfies the ordinary differential equation initial value problem

$$\begin{cases} y' - 2xy = 3x \\ y(0) = 1. \end{cases}$$

3. Find the antiderivative $\displaystyle\int \frac{dx}{2x^2 - 3}$.