MATH 230 NAME:

6.6

Directions: Show all work on a separate sheet of paper for full credit.

1. Differentiate the function

   (a) $g(x) = (\tan^{-1}(x))^2$ $\dfrac{2\tan^{-1} x}{1+x^2}$

   (b) $h(x) = \cos^{-1}(\sin^{-1}(x))$ $-\dfrac{1}{\sqrt{1-(\sin^{-1} t)^2}} \cdot \dfrac{1}{\sqrt{1-t^2}}$

   (c) $f(x) = \sin^{-1}(1/x)$ $\dfrac{1}{\sqrt{1-(1/x)^2}} \cdot \dfrac{-1}{x^2}$

2. Evaluate the integral.

   (a) $\displaystyle\int_0^{1/2} \frac{\sin^{-1}(x)}{\sqrt{1-x^2}} dx$ $\dfrac{\pi^2}{72}$

   (b) $\displaystyle\int \frac{e^{2x}}{\sqrt{1-e^{4x}}} dx$ Let $u = e^{2x}$ Answer: $\dfrac{1}{2}\sin^{-1}(e^{2x}) + C$

   (c) $\displaystyle\int_0^{\pi/2} \frac{\sin(x)}{1+\cos^2(x)}\, dx$ Let $u = \cos(x)$. Answer: $\pi/4$

3. Find the exact value of the expression.

   (a) $\tan(\arctan 10)$ 10

   (b) $\tan(\sin^{-1}(2/3))$ $\dfrac{2}{\sqrt{5}}$

   (c) $\csc(\arccos(3/5))$ $\dfrac{5}{4}$

4. Simplify $\tan(\sin^{-1}(x))$ $\dfrac{x}{\sqrt{1-x^2}}$

5. Evaluate $\displaystyle\lim_{x\to-\infty} \tan^{-1}(e^x)$ 0

6. Evaluate $\displaystyle\lim_{x\to\infty} \tan^{-1}(e^x)$ $\pi/2$