MATH 230 NAME:
6.4*

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

1. Write the expression as a power of e.
   a) $4^{-\pi}$ $e^{-\pi \ln 4}$
   b) 10^{x^2} $e^{x^2 \ln 10}$

2. Evaluate the expression.
   (a) $\log_{10} \sqrt{10}$ $1/2$
   (b) $\log_{10} 40 + \log_{10} 2.5$ $\log_{10} f(100) = 2$

3. Evaluate the limit.
   (a) $\lim_{x \to -\infty} (1.001)^x$ 0
   (b) $\lim_{x \to \infty} \arctan(e^x)$ $\pi/2$

4. Differentiate the function.
   (a) $a(x) = x^5 + 5^x$ $5x^4 + 5^x \ln 5$
   (b) $b(x) = x \sin(2^x)$ $x2^x \cos(2^x) \ln 2 + \sin(2^x)$
   (c) $c(x) = 3^{\cos(2x)}$ $3^{\cos 2x} \cdot -2 \sin(2x) \ln 3$
   (d) $d(x) = (1 + 10^{\ln(x)})^6$ $6(1 + 10^{\ln x})^5 \cdot \dfrac{10^{\ln x} \ln 10}{x}$
   (e) $e(x) = x^x$ $x^x(1 + \ln x)$
   (f) $f(x) = (\sin(x))^{\ln(x)}$ $(\sin x)^{\ln x} \left(\ln(x) \cot(x) + \dfrac{\ln \sin x}{x} \right)$

5. Evaluate the integral.
   (a) $\int_0^4 2^x dx$ $\left. \dfrac{2^x}{\ln 2} \right|_0^4 = \dfrac{15}{\ln 2}$
   (b) $\int (x^5 + 5^x) dx$ $\dfrac{1}{6}x^6 + \dfrac{5^x}{\ln 5} + C$
   (c) $\int \dfrac{\log_{10} x}{x} dx$ $\dfrac{\ln 10}{2} \cdot (\log_{10} x)^2$ OR $\dfrac{1}{2 \ln 10} (\ln x)^2 + C$
   $\int x2^{x^2} dx$ $\dfrac{1}{2 \ln 2} 2^{x^2} + C$