Review problems for Test II

MATH 2423

November 7, 2005

1. Find the formula for the inverse function $f(x) = 2x^2 - 8x$, $x \geq 2$.

2. Find $(f^{-1})'(a)$, if $f(x) = x^5 - x^3 + 2x$ and $a = 2$.

3. Express as a single logarithm $\ln x + a \ln y - b \ln z$.

4. Solve the equation

   a) $\log_{10}(x + 1) = 4$

   b) $2 \ln x = \ln 2 + \ln(3x - 4)$

5. Find the limit

   a) $\lim_{x \to 0} \frac{\cos 2x - \cos 3x}{x^2}$

   b) $\lim_{x \to -\infty} x^2 e^x$

   c) $\lim_{x \to 0} (\cos 3x)^{5/x}$

6. Differentiate

   a) $y = \cos(e^{\pi x})$

   b) $y = \sqrt{1 + 2e^{2x}}$

   c) $y = \ln(x + \sqrt{x^2 - 1})$

   d) $y = \ln|2 - x - 5x^2|$

   e) $y = x^{\ln x}$

   f) $y = \arctan(\cos \theta)$

7. Integrate

   a) $\int e^x \sin(e^x) dx$

   b) $\int_e^6 \frac{dx}{x \ln x}$

c) $\int_0^{\pi/2} \frac{\sin x}{1+\cos^2(x)} dx$

d) $\int x^2 \cos 2x dx$

e) $\int_1^{\sqrt{3}} \arctan(1/x) dx$

f) $\int \cot^5 \theta \sin^4 \theta d\theta$

g) $\int \tan^4 x dx$

h) $\int \frac{x^2+2x-1}{x^3-x} dx$

i) $\int \frac{x^3}{x^3+1} dx$

j) $\int \frac{dx}{x^2\sqrt{1+x^2}} dx$

k) $\int_1^2 \frac{\sqrt{x^2-1}}{x} dx$