MATH 152
Mrs. Bonny Tighe

QUIZ 2A
7.3-7.4
25 points

NAME Answers

Section _____ Wed 9/14/05

1. Differentiate.

a) $f(x) = \ln(\sin^4 x)$

$f'(x) = \frac{1}{\sin^4 x} \cdot 4\sin^3 x \cdot (\cos x)$

$= 4\frac{\cos x}{\sin x} = 4\cot x$

b) $y = \ln\left(\frac{\sqrt{x+1}(\sec 3x)}{(2x-1)^4}\right)$

$y = \frac{1}{2}\ln(x+1) + \ln(\sec 3x) - 4\ln(2x-1)$

$\frac{dy}{dx} = \frac{1}{2(x+1)} + \frac{1}{\sec 3x}(\sec 3x \tan 3x)(3) - \frac{4(2)}{2x-1}$

$\frac{dy}{dx} = \frac{1}{2(x+1)} + 3\tan 3x - \frac{8}{2x-1}$

2. Find the exact value: a) $3^{3\log_3 2} =$ _____ b) $\log_2 22 - \log_2 11 =$ _____

$3^{\log_3 8} = 8$

$\log_2 \frac{22}{11} = \log_2(2) = 1$

3. Solve for x.

a) $\log_5(2-2x) = 2$

$5^2 = 2-2x$

$2x = 2-25$

$x = -23/2$

b) $4e^{2x-1} = 2$

$e^{2x-1} = 1/2$

$\ln 1/2 = 2x - 1$

$\frac{\ln 1/2 + 1}{2} = x$

c) $2e^{2x} + e^x - 3 = 0$

$(2e^x + 3)(e^x - 1) = 0$

$e^x = -3/2 \quad e^x = 1$

$x = 0$

4. Find an equation of the tangent line to the curve $y = \log_2 x^3$ at the point (2,3)

$y - y_1 = m(x - x_1)$

$m = dy/dx$

$y - 3 = \quad (x-2)$

$y = 3\log_2 x$

$dy/dx = \frac{3}{x \ln 2}$ at $x = 2$

$= \frac{3}{2\ln 2}$

$y - 3 = \frac{3}{2\ln 2}(x-2)$ or

$y = \frac{3}{2\ln 2}x - \frac{6}{2\ln 2} + 3$

5. Evaluate:

a) $\int_0^2 \frac{x^2}{3+x^3}dx =$ _____

$\frac{1}{3}\int_0^2 \frac{1}{u}du$ $\quad u = 3+x^3$ $\quad du = 3x^2dx$

$\frac{1}{3}\ln|3+x^3|\Big|_0^2 =$

$\frac{1}{3}\ln(11) - \frac{1}{3}\ln(3)$

b) $\int \frac{(\ln x)}{x}dx =$ _____

$\int u\,du$ $\quad u = \ln x$ $\quad du = \frac{1}{x}dx$

$\frac{1}{2}(\ln x)^2 + C$

c) $\int \frac{2^{3x}}{3-2^{3x}}dx =$ _____

$\int \frac{1}{u}du$ $\quad u = 3-2^{3x}$ $\quad du = -3\cdot 2^{3x}\ln 2$

$-\frac{1}{3\ln 2}\ln|3-2^{3x}| + C$

d) $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}dx =$ _____

$2\int e^u du$ $\quad u = \sqrt{x}$ $\quad du = \frac{1}{2\sqrt{x}}dx$

$2e^{\sqrt{x}} + C$

6. Use logarithmic differentiation to find the derivative of a) $y = x^{\cos 3x}$

$\ln y = \cos 3x \ln x$

$\frac{1}{y}dy/dx = \cos 3x \cdot \frac{1}{x} + \ln x(-\sin 3x)(3)$ $\quad \frac{dy}{dx} = \left(\frac{\cos 3x}{x} - 3\sin 3x \ln x\right)\left(x^{\cos 3x}\right)$

b) $y = \sqrt{\frac{2x-1}{\sin x}}$

$\ln y = \frac{1}{2}\ln(2x-1) - \frac{1}{2}\ln(\sin x)$

$\frac{1}{y}dy/dx = \frac{1}{2}\cdot\frac{1}{2x-1}(2) - \frac{1}{2}\cdot\frac{1}{\sin x}(\cos x)$

$dy/dx = \left(\frac{1}{2x-1} - \frac{1}{2}\cot x\right)\left(\sqrt{\frac{2x-1}{\sin x}}\right)$