MATH 152
Mrs. Bonny Tighe

QUIZ 1A

7.1-7.3
25 points

NAME Answers

Section _______ Wed 2/8/06

1. Find a formula for the inverse of the function $f(x)=\dfrac{e^x-1}{2+e^x}$

$x=\dfrac{e^y-1}{2+e^y}$

$2x+xe^y=e^y-1$

$2x+1=e^y(1-x)$

$\dfrac{2x+1}{1-x}=e^y$

$y=\ln\left(\dfrac{2x+1}{1-x}\right)$ or

$y=\ln(2x+1)-\ln(1-x)$ or

$y=\ln(x-1)-\ln(-2x-1)$

2 . Find the derivative: a) $y=(3e^{\sqrt{x}})\left(\frac{1}{x^3}\right)$

$dy/dx=3e^{\sqrt{x}}\left(-\dfrac{3}{x^4}\right)+\dfrac{1}{x^3}\cdot 3e^{\sqrt{x}}\cdot\dfrac{1}{2\sqrt{x}}=\dfrac{-9e^{\sqrt{x}}}{x^4}+\dfrac{3e^{\sqrt{x}}}{2x^3\sqrt{x}}$

b) $g(x)=\dfrac{e^{\csc x}}{2-\sqrt{x}}$

$g'(x)=\dfrac{(2-\sqrt{x})(e^{\csc x})(-\csc x\cot x)-e^{\csc x}\left(-\frac{1}{2\sqrt{x}}\right)}{(2-\sqrt{x})^2}$

$g'(x)=\dfrac{-\csc x\cot x\, e^{\csc x}(2-\sqrt{x})+\frac{e^{\csc x}}{2\sqrt{x}}}{(2-\sqrt{x})^2}=\dfrac{-2\sqrt{x}\csc x\cot x\, e^{\csc x}(2-\sqrt{x})+e^{\csc x}}{2\sqrt{x}\,(2-\sqrt{x})^2}$

3. Find $(f^{-1})'(a)$ for $f(x)=\dfrac{x+1}{2-x}$ at $a=2$.

$g'(a)=\dfrac{1}{f'(g(a))}$

$\dfrac{x+1}{2-x}=2$

$x+1=4-2x$

$3x=3$

$x=1$

$f(1)=2$ so $g(2)=1$

$f'(x)=\dfrac{(2-x)(1)-(x+1)(-1)}{(2-x)^2}$

$f'(x)=\dfrac{2-\cancel{x}+\cancel{x}+1}{(2-x)^2}=\dfrac{3}{(2-x)^2}$

$\dfrac{3}{(2-1)^2}=3$

$g'(2)=\dfrac{1}{3}$

4. Find dy/dx if $ye^x = \cos y + e^{xy}$

$xe^{xy}\, dy/dx + ye^{xy}$

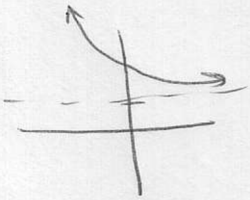
$ye^x + e^x\, dy/dx = -\sin y\, dy/dx + e^{xy}(x\, dy/dx + y)$

$e^x\, dy/dx + \sin y\, dy/dx - xe^{xy}\, dy/dx = ye^{xy} - ye^x$

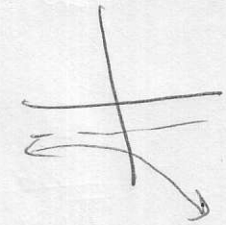
$$dy/dx = \frac{ye^{xy} - ye^x}{e^x + \sin y - xe^{xy}}$$

5. Find the limit.

a) $\lim_{x\to\infty}(e^{-x}+1) =$ 1 b) $\lim_{x\to\infty}\frac{e^x - e^{-x}}{e^x + e^{-x}} =$ 1 c) $\lim_{x\to-\infty}(-e^{2x}-1) =$ -1



$$\frac{e^x - \frac{1}{e^x}}{e^x + \frac{1}{e^x}}$$



6. Evaluate the integral:

a) $\int e^{-x}\sqrt{e^{-x}+3}\, dx$ b) $\int e^{3x}\sec(e^{3x})\tan(e^{3x})dx$ c) $\int_1^4 \frac{e^{\sqrt{x}}}{\sqrt{x}}dx$ $\int_1^4 e^{\sqrt{x}}\frac{1}{\sqrt{x}}dx$

$-\int (e^{-x}+3)^{1/2} - e^{-x}\, dx$

$-\frac{1}{3/2}(e^{-x}+3)^{3/2} + C$

$-\frac{2}{3}(e^{-x}+3)^{3/2} + C$

$\frac{1}{3}\sec e^{3x} + C$

$2e^{\sqrt{x}}\Big|_1^4 =$

$2e^2 - 2e^1$

7. Solve for x:

a) $3e^{2x-1} = 6$ b) $\ln(x+2) - \ln x = 2$ c) $3 = e^{2x} - 2e^x$

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

$\ln 2 = 2x - 1$

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

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

$\frac{x+2}{x} = e^2$

$x + 2 = e^2 x$

$x - e^2 x = -2$

$x(1-e^2) = -2$

$x = \frac{-1}{1-e^2}$ or $x = \frac{1}{e^2-1}$

$0 = e^{2x} - 2e^x - 3$

$(e^x - 3)(e^x + 1)$

$e^x = 3,\ \cancel{x}$

$\ln 3 = x$