MATH 152
Mrs. Bonny Tighe

QUIZ 1
7.1-7.3
25 points

NAME Answers
Wednesday 2/8/06 Section ______

1. Find $(f^{-1})'(a)$ for $f(x) = \dfrac{x+1}{5-x}$ at $a = 1$.

$\dfrac{x+1}{5-x} = 1$

$x+1 = 5-x$

$2x = 4$

$x = 2$

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

$f'(x) = \dfrac{(5-x)-(x+1)(-1)}{(5-x)^2} =$

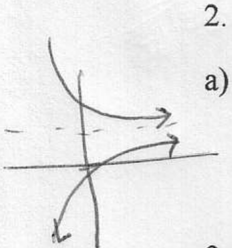
$f'(x) = \dfrac{5-\cancel{x}+\cancel{x}+1}{(5-x)^2} = \dfrac{6}{(5-x)^2}$

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

$g'(1) = \dfrac{1}{f'(2)} = \dfrac{1}{\frac{6}{(5-2)^2}} =$

$\frac{9}{6}$ $3/2$

2. Find the limit.



a) $\lim\limits_{x\to\infty}(-e^{-x}+1) =$ 1

b) $\lim\limits_{x\to\infty}\dfrac{2e^{x}-e^{-x}}{e^{x}+e^{-x}} =$ 2

$\lim\limits_{x\to\infty}(1.000001)^{x} =$ ∞

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

$e^{xy}(x\, dy/dx + y(1)) = 1 + -\sin y\, dy/dx$

$xe^{xy}\, dy/dx + \sin y\, dy/dx = 1 - e^{xy}(y)$

$$\boxed{dy/dx = \frac{1-ye^{xy}}{xe^{xy}+\sin y}}$$

4. Find a formula for the inverse of the function $f(x) = \dfrac{2-3^{x}}{1+3^{x}}$

$x = \dfrac{2-3^{y}}{1+3^{y}}$

$x + x3^{y} = 2-3^{y}$

$x3^{y} + 3^{y} = 2-x$

$3^{y}(x+1) = 2-x$

$3^{y} = \dfrac{2-x}{x+1}$

$\boxed{\log_3\left(\frac{2-x}{x+1}\right) = y}$

or $\log_3(2-x) - \log_3(x+1) = y$

or

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

$y = \ln\left(\dfrac{2-x}{x+1}\right)\cdot\dfrac{1}{\ln 3}$

or

5. Find the derivative: a) $y = 2e^{x^3}(x\sqrt{x})$ $= 2e^{x^3} \cdot x^{3/2}$

$dy/dx = 2e^{x^3} \cdot \frac{3}{2}x^{1/2} + x^{3/2} \cdot 2e^{x^3}(3x^2) =$

$3\sqrt{x}\, e^{x^3} + 6x^3\sqrt{x}\, e^{x3}$

b) $g(x) = \dfrac{e^{\cos x}}{1-2e^{2x}}$ $g'(x) = \dfrac{(1-2e^{2x})(e^{\cos x}(-\sin x)) - e^{\cos x}(-4e^{2x})}{(1-2e^{2x})^2}$

$g'(x) = \dfrac{-\sin x\, e^{\cos x}(1-2e^{2x}) + 4e^{2x}e^{\cos x}}{(1-2e^{2x})^2}$

6. Evaluate the integral:

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

$\int \sin u\, du$ $\int e^u du$

$2\int e^{\sqrt{x}} \cdot \frac{1}{2\sqrt{x}}dx$ $-\frac{1}{3}\cos e^{3x} + C$ $\int e^{\sin x}\cos x\,dx$

$e^{\sin x} + C$

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

$2e^2 - 2e^1$

7. Solve for x:

a) $2e^{x+1} = 6$

$e^{x+1} = 3$

$\ln 3 = x+1$

$\ln 3 - 1 = x$

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

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

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

$e^x = 2, \cancel{-1}$

$\ln 2 = x$

c) $\ln x - \ln(x+2) = 3$

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

$\frac{x}{x+2} = e^3$

$x = e^3 x + 2e^3$

$x - xe^3 = 2e^3$

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

$x = \dfrac{2e^3}{1-e^3}$