MATH 205
Spring 2002

SAMPLE QUESTIONS FOR QUIZ 6
PART 2

SOLUTION KEY

Dr. Bogacki

Differentiate each function

6. $f(x) = \cos\left(5x^2 + 1\right)$

$$\frac{d}{dx}f(x) = -\sin\left(5x^2 + 1\right)\cdot(10x)$$

7. $h(x) = (\cos(x))^3$

$$\frac{d}{dx}h(x) = 3\,(\cos(x))^2\cdot(-\sin(x))$$

8. $g(x) = \sec\left(e^x\right)$

$$\frac{d}{dx}g(x) = \sec\left(e^x\right)\cdot\tan\left(e^x\right)\cdot e^x$$

9. $f(x) = e^{\sec(x)}$

$$\frac{d}{dx}f(x) = e^{\sec(x)}\cdot\sec(x)\cdot\tan(x)$$

10. $g(x) = \left(e^x + 4x\right)^9$

$$\frac{d}{dx}g(x) = 9\left(e^x + 4x\right)^8\cdot\left(e^x + 4\right)$$

11. $h(x) = 9^x = e^{\ln(9)\cdot x}$

$$\frac{d}{dx}h(x) = e^{\ln(9)\cdot x}\cdot\ln(9) = 9^x\cdot\ln(9)$$

12. $f(x) = (\sin(x))^x = e^{\ln(\sin(x))\cdot x}$

$$\frac{d}{dx}f(x) = e^{\ln(\sin(x))\cdot x}\cdot\left(\frac{1}{\sin(x)}\cdot\cos(x)\cdot x + \ln(\sin(x))\right)$$

$$= (\sin(x))^x\cdot(x\cdot\cot(x) + \ln(\sin(x)\ )$$

13. $g(x) = x^{\sin(x)} = e^{(\ln(x))\cdot\sin(x)}$

$$\frac{d}{dx}g(x) = e^{\ln(x)\cdot\sin(x)}\cdot\left(\frac{1}{x}\cdot\sin(x) + \ln(x)\cdot\cos(x)\right)$$

$$= x^{\sin(x)}\cdot\left(\frac{\sin(x)}{x} + \ln(x)\cdot\cos(x)\right)$$

14. $h(x) = \tan\left(\sqrt{x^2 + 4x}\right)$

$$\frac{d}{dx}h(x) = \left(\sec\left(\sqrt{x^2 + 4x}\right)\right)^2\cdot\frac{1}{2}\cdot\left(x^2 + 4x\right)^{\frac{-1}{2}}\cdot(2x + 4)$$

15. $f(x) = \sqrt{\cot(3x + \csc(x))}$

$$\frac{d}{dx}f(x) = \frac{1}{2}\cdot(\cot(3x + \csc(x)))^{\frac{-1}{2}}\cdot\left[-\left(\csc(3x + \csc(x))^2\right)\right]\cdot(3 - \csc(x)\cdot\cot(x))$$