Circle your Instructor: Faudree, Williams, Zirbes _____ / 15

Name: _____

This is a 30 minute quiz. There are 15 problems. Books, notes, calculators or any other aids are prohibited. Calculators and notes are not allowed. **Your answers should be simplified unless otherwise stated.** They should begin $y' =$ or $f'(x) =$ or $dy/dx =$, etc. There is no partial credit. If you have any questions, please raise your hand.

Circle your final answer.

For each function below, find the derivative.

1. $g(x) = 3x^{\pi} - e^3$

$g'(x) = 3\pi x^{\pi-1}$

2. $F(\theta) = \theta \tan(\theta)$

$F'(\theta) = \tan\theta + \theta \sec^2\theta$

3. $f(x) = \cot(3x) - 3^x$

$f'(x) = -\csc^2(3x) \cdot 3 - \ln(3) \cdot 3^x$

$= -3\csc^2(3x) - \ln(3) \cdot 3^x$

4. $y = \frac{-5}{\sqrt{x^2-9}}$ $= -5\left(x^2-9\right)^{-1/2}$

$y' = \frac{5}{2}\left(x^2-9\right)^{-3/2} \cdot 2x = \frac{5x}{\left(x^2-9\right)^{3/2}}$

5. $h(x) = (5x+2)(3-x)^3$

$h'(x) = 5(3-x)^3 - 3(5x+2)(3-x)^2$

$= \left[(15-5x) - (15x+6)\right](3-x)^2$

$= (9-20x)(3-x)^2$

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

$y' = \frac{1}{3} + \frac{2}{x^2}$

7. $F(x) = \frac{\sin(x)}{x^2+1}$ (Use the Quotient Rule.)

$F'(x) = \frac{\cos(x)(x^2+1) - \sin(x)\cdot 2x}{(x^2+1)^2}$

8. $z = \frac{2s^2 - s + 3}{\sqrt{s}}$ $= 2s^{3/2} - s^{1/2} + 3s^{-1/2}$

$z' = 3s^{1/2} - \frac{1}{2}s^{-1/2} - \frac{3}{2}s^{-3/2}$

9. $y = 3x^{5/2}(x-1)$ $= 3x^{7/2} - 3x^{5/2}$

$y' = \frac{21}{2}x^{5/2} - \frac{15}{2}x^{3/2}$

$= \frac{3}{2}x^{3/2}\left[7x - 5\right]$

10. $G(x) = \ln\left(\frac{xe^x}{(x^2+3)^3}\right)$ $= \ln(x) + \ln(e^x) - 3\ln(x^2+3)$

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

$G'(x) = \frac{1}{x} + 1 - \frac{6x}{x^2+3}$

11. $h(x) = xe^x(\sin x)$

$h'(x) = e^x \sin x + xe^x \sin x + xe^x \cos x$

$= e^x(\sin x + x\sin x + x\cos x)$

12. $H(x) = \arccos(\ln(2x))$

$$H'(x) = \frac{-1}{\sqrt{1-[\ln(2x)]^2}} \cdot \frac{1}{2x} \cdot 2 = \frac{-1}{x\sqrt{1-[\ln(2x)]^2}}$$

13. $f(x) = (2x + \cos(5x))^{-5}$ [You don't need to simplify, but use parentheses correctly.]

$$f'(x) = -5(2x + \cos(5x))^{-6} \cdot (2 - 5\sin(5x))$$

14. $g(x) = xe^{1/x^2}$

$$g'(x) = e^{1/x^2} + x e^{1/x^2}\left(\frac{-2}{x^3}\right)$$

$$= e^{1/x^2}\left(1 - \frac{2}{x^2}\right)$$

15. Find dP/dr for $P = A\arcsin(mr) + 2Am$ where A and m are fixed constants.

$$\frac{dP}{dr} = \frac{Am}{\sqrt{1-m^2r^2}}$$