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. $g(x) = 2x^{\pi} - e^2$

$g'(x) = 2\pi x^{\pi-1}$

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

$F'(\theta) = \cos(\theta) - \theta \sin(\theta)$

3. $f(x) = 10^x - \csc(2x)$

$f'(x) = \ln(10)\, 10^x + \csc(2x)\cot(2x) \cdot 2$

$= \ln(10)\, 10^x + 2\csc(2x)\cot(2x)$

4. $y = \frac{-2}{\sqrt{x^2-16}}$ $= -2(x^2-16)^{-1/2}$

$y' = -2 \cdot \left(\frac{-1}{2}\right)(x^2-16)^{-3/2} \cdot 2x = \frac{2x}{(x^2-16)^{3/2}}$

5. $h(x) = (3x+5)(4-x)^3$

$h'(x) = 3(4-x)^3 - 3(3x+5)(4-x)^2$

$= (4-x)^2(12-3x-9x-15)$

$= (4-x)^2(-3-12x)$

6. $y = \frac{2}{x} - \frac{x}{4}$

$y' = \frac{-2}{x^2} - \frac{1}{4}$

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

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

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

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

$z' = \frac{9}{2}s^{1/2} - s^{-1/2} - \frac{1}{2}s^{-3/2}$

9. $y = 5x^{5/2}(x-2)$ $= 5x^{7/2} - 10x^{5/2}$

$y' = \frac{35}{2}x^{5/2} - 25x^{3/2} = 5x^{3/2}\left(\frac{7}{2}x - 5\right)$

10. $G(x) = \ln\left(\frac{xe^x}{(x^2+2)^4}\right)$ $= \ln(xe^x) - 4\ln(x^2+2)$

$= \ln(x) + \ln(e^x) - 4\ln(x^2+2)$

$= \ln(x) + x - 4\ln(x^2+2)$

$G'(x) = \frac{1}{x} + 1 - \frac{4}{x^2+2}\cdot 2x = \frac{1}{x} + 1 - \frac{8x}{x^2+2}$

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

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

$= e^x\left(\cos(x) + x\cos(x) - x\sin(x)\right)$

12. $H(x) = \arccos(\ln(3x))$

$$H'(x) = \frac{-1}{\sqrt{1-[\ln(3x)]^2}} \cdot \frac{1}{3x} \cdot 3 = \frac{-1}{x\sqrt{1-[\ln(3x)]^2}}$$

13. $f(x) = (5x + \sin(2x))^{-4}$ [You don't need to simplify, but use parentheses correctly.]

$$f'(x) = -4\,(5x + \sin(2x))^{-5} \cdot (5 + 2\cos(2x))$$

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

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

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

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

$$\frac{dP}{dr} = \frac{A}{\sqrt{1-(mr)^2}} \cdot m = \frac{Am}{\sqrt{1-m^2r^2}}$$