Name: _____ _____ **/ 25**

Please circle your instructor's name: James Gossell Gordon Williams

There are 25 points possible on this quiz. Any outside materials are not allowed. **For full credit, show all work clearly.**

1. [12 points] Find $f'(x)$ for each function below. You may use any method you like, and you do not need to simplify your answer.

a. $f(x) = 4\tan(x) + 5\csc(x)$

b. $f(x) = x^2\sec(x) + \cos(\pi)$

c. $f(x) = \dfrac{\cot(x)}{x^5 - x}$

d. $f(x) = (x^2 + \sin(x))^{\frac{1}{3}}$

2. [6 points]

The **height** of a person riding a Ferris wheel is given by the function:

$$h(t) = 16 - 15\cos\left(\frac{\pi t}{20}\right),$$

where t is measured in seconds and $h(t)$ is measured in meters.

a. Find the vertical velocity function $(h'(t))$ of the rider.

b. Using your answer from part (a), determine whether the rider is moving upward or downward 30 seconds into the ride. Justify your answer.

3. [7 points]

Let $g(x) = \left(3x^2 - 12x\right)^5$.

a. Find $g'(x)$ using the chain rule.

b. Using your answer from part (a), determine the x-values for which $g(x)$ has a **horizontal tangent line**.