score	possible	problem
	30	1
	20	2
	20	3
	30	4
	100	

Name: _____
Name: _____
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Work in groups of 3 or 4. Show your work. Aknowledge any help on these specific problems.

1. Compute the following derivatives:

/15 (a) $\dfrac{d}{dx}\sec\left(x\sin(x^2+1)\right) =$

/15 (b) $\dfrac{d}{dx}\left(x+\dfrac{1}{x^3+1}\right)^{\sqrt{7}} =$

/20 2. Use implicit differentiation to find the equation of the tangent line to the curve defined by

$$x^2 + y^2 = (2x^2 + 2y^2 - x)^2$$

at the point $(0, 1/2)$.

/10 3. (a) A cylindrical tank with radius 5m is being filled with water at a rate of $3\text{m}^3/\text{min}$.

- Draw and label a diagram illustrating this scenario.
- Write an equation relating the volume of water in the tank and the height of water in the tank.

/10 (b) A plane flying horizontally at an altitude of 1km and speed of 500km/hr flies directly over a radar station.

- Draw and label a diagram illustrating this scenario.
- Write an equation relating the horizontal distance from the plane to the radar station and the direct (diagonal) distance from the plane to the radar station,

/15 4. (a) A man starts running north at 4m/s from a point P. Five minutes later a woman starts running south at 5m/s from a point 500m due east of P.

- Draw and label a diagram illustrating this scenario.
- Write an equation relating the distance of the man from P, the distance of the woman from her starting point, and the distance from the man to the woman.

/15 (b) A trough is 10m long and its ends have the shape of isosceles triangles that are 3m across at the top and have a height of 1m. The trough is being filled with water at a rate of $12\text{m}^3/\text{min}$.

- Draw and label a diagram illustrating this scenario.
- Write an equation relating the volume of water in the trough and the height of water in the trough.