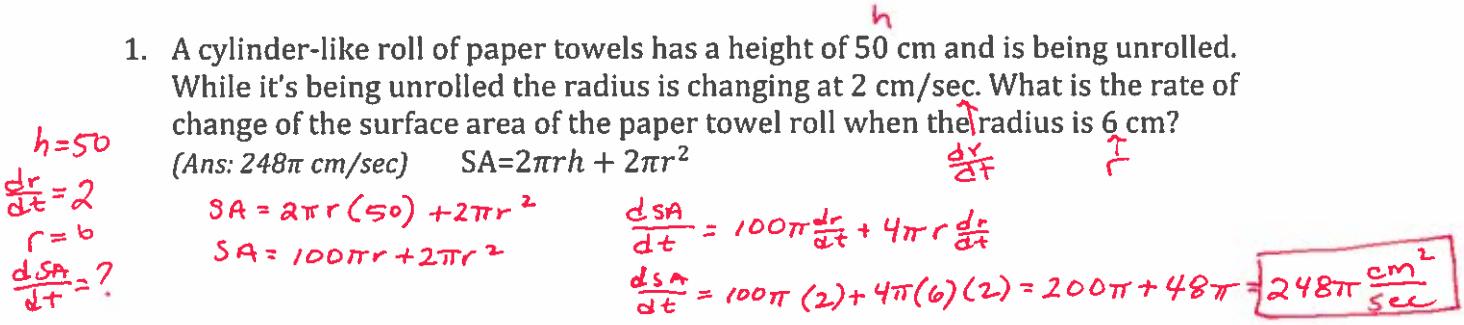
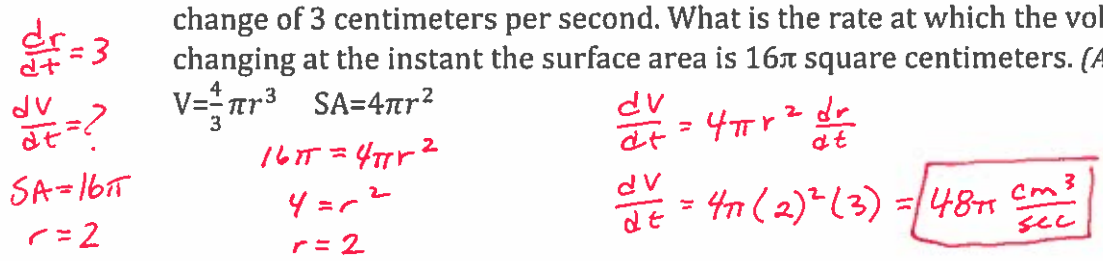
Who you be? Key

AP Calculus AB: Advanced Related Rates

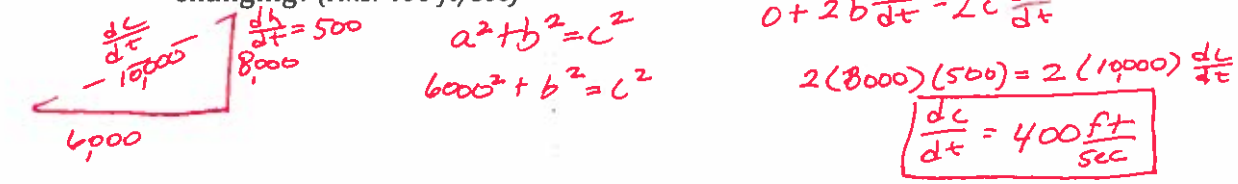
1. A cylinder-like roll of paper towels has a height of 50 cm and is being unrolled. While it's being unrolled the radius is changing at 2 cm/sec. What is the rate of change of the surface area of the paper towel roll when the radius is 6 cm? *(Ans: 248π cm/sec)* $SA=2\pi rh+2\pi r^2$



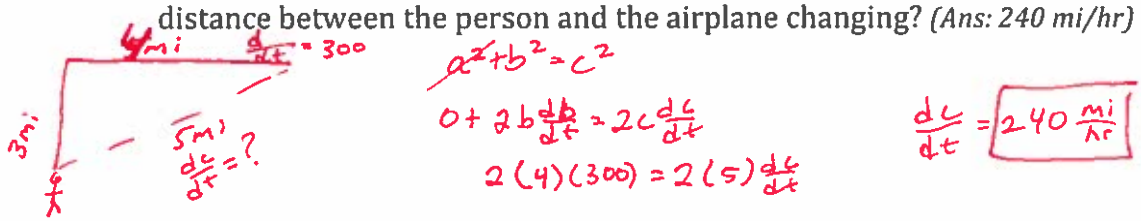
2. A spherical balloon is being filled up with helium so that the radius has a rate of change of 3 centimeters per second. What is the rate at which the volume is changing at the instant the surface area is 16π square centimeters. *(Ans: 48π cm³/sec)*



3. A camera is mounted 6,000 feet from the space shuttle launching pad. The camera needs to keep the shuttle in focus. If the shuttle is rising vertically at 500 ft/sec. When the shuttle is 8,000 ft high, how fast is the camera to shuttle distance changing? *(Ans: 400 ft/sec)*



4. A person is trying to take a picture of an airplane; the airplane begins from 3 miles directly above him and is traveling at a rate of 300 miles per hour horizontally. When the airplane is exactly 5 miles away from the person, at what rate is the distance between the person and the airplane changing? *(Ans: 240 mi/hr)*



5. A man is tracking a rocket with a telescope and wants to determine its velocity. The rocket is being launched from a launching pad that is 100 meters away. As the man follows the rocket with his telescope the angle is changing at a rate of 3 radians per second. What is the velocity of the rocket at the moment the telescope has an angle of $\frac{\pi}{6}$. *(Ans: 400 m/s)*