

Calculus Exam Review Questions

1. A kite is flying at a constant altitude of 13m. If the string is being let out at a rate of 10 m/min, determine the rate at which the kite is moving when 50 m of string has been released.
2. Determine an expression for $\frac{dy}{dx}$ given that: $2x - 6y^3 + xy^2 = 12x + 1$.
3. A toy boat is being pulled through the water by a girl pulling on a rope. The girl is standing on a dock 72 cm above the water level. She is pulling the rope in at a constant rate of 50 cm/min. Determine how quickly the boat is moving through the water when it is 96 cm from the side of the dock.
4. A large hot air balloon has the shape obtained by revolving the curve $y = x^3 - 4x^2 - 11x - 6$ from $x=0$ to $x=6$ about the x -axis, where x and y are measured in metres. Find the volume of the tank and indicate the units or measure.
5. A projectile launched vertically from a plane has height $x = -5t^2 + 100t + 1500$ after t seconds. Find:
 - a) its maximum height.
 - b) its velocity after 15 seconds.
 - c) its velocity upon striking the ground.
6. A conical tank with its vertex pointing down has height 4 m and radius 1 m at the top. Oil flows in at the rate $0.05\text{m}^3/\text{min}$. When the depth of the oil is 2 m how fast is the level of the oil rising?
7. A big stone thrown into a pond produces a circular ripple, which expands from the point of impact. When the radius is 8m it is observed that the radius is increasing at a rate of 1.5 m/sec. How fast is the area enclosed by the ripple increasing at that instant?
8. A ball thrown straight up reaches a height of $3 + 12t - 5t^2$ metres in t seconds. How high will it go?
9. A car is sitting 25 feet from a marker on a highway. At 12 noon it starts to move away from the marker. Its velocity during the next 10 seconds is given by: $v(t) = 5t + t^{1.04}$ ft/sec/
 - a) Find an expression for its acceleration at time t from $0 < t < 10$ seconds.
 - b) How far from its position at 12 noon is the car at 10 seconds past noon?
10. A balloon rises straight up from the ground at a constant rate of 5 ft/sec. At the instant it reaches an altitude of 100 ft, how fast is its angle of inclination changing as seen from the ground 100 feet from the point of release?