Calculus 45S Chapter 4 Review

1.) Find the maximum and minimum values of $f(x) = x^3 - 9x$ on the interval $-4 \le x \le 4$.

2.) Find the extreme values of $\dfrac{1}{\sqrt{9 - x^2}}$

3.) Sketch the curve of the function $f(x) = x^6 - 10x^4$.

4.) A rectangular open-topped storage bin is to have a square base and vertical sides. If 48 m^2 of plywood are available for its construction, find the shape that encloses the greatest volume.

5.) A cylindrical can is to hold 20 π $m.^3$ The material for the top and bottom costs \$10/$m.^2$ and material for the side costs \$8/$m.^2$ Find the radius r and height h of the most economical can

6.) Sam blows up a spherical balloon. If the radius increases at the rate of 1 cm/s, how fast is the volume increasing when the radius is 10 cm?

7.) Water is being poured into s cylindrical rain barrel of radius 30 cm at a rate of 500 cm^3/min. How fast is the water level in the barrel rising?

8.) A water tank is in the shape of an inverted right circular cone with depth 5 m and top radius of 2 m. Water leaks out of the tank at a rate proportional to the depth of the water in the tank. When the water in the tank is 4 m deep it is leaking out at a rate of $\dfrac{1}{12}$ m^3/min; how fast is the water level in the tank dropping at that time?

9.) A ladder 20 feet long leans against a vertical building. If the bottom of the ladder slides away from the building horizontally at a rate of 2 ft/sec, how fast is the ladder sliding down the building when the top of the ladder is 12 ft above the ground?