Math 182- Quest 2   February 11, 2022   Name: _____

> Read all directions carefully and write your answers in the space provided. To receive full
> credit, you must show all of your work.

Question 0: (30pts):P17 page 488. Multiple Choice: Which of the following are improper integrals? You may select more than one choice.

1. $\int_1^2 \frac{1}{2x-1}dx$

2. $\int_0^1 \frac{1}{2x-1}dx$

3. $\int_{-\infty}^{\infty} \frac{\sin x}{1+x^2}dx$

4. $\int_1^2 \ln(x-1)dx$

5. $\int_0^1 \frac{\ln x}{\sqrt{x}}dx$

6. $\int_{-\infty}^0 \frac{1}{x^2+5}dx$

Question 1: (30pts):P17 page 488. Describe the solid whose volume is given by the integral.

1. $\int_0^{\pi/2} 2\pi \cos^2 x\, dx$

2. $\int_0^1 \pi \left[\left(2-x^2\right)^2 - (2-\sqrt{x})^2 \right] dx$

Question 2: (30pts): problem 27 page 489. A force of 30 N is required to maintain a spring stretched from its natural length of 12 m to a length of 15 m. How much work is done in stretching the spring from 12 m to 20 m ?
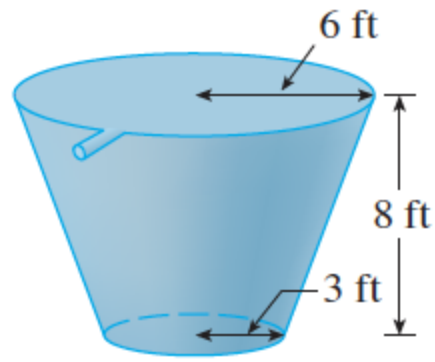
Question 3: (30pts): problem 28 page 489. A 1600 -lb elevator is suspended by a 200 -ft cable that weighs 10lb/ft. How much work is required to raise the elevator from the basement to the third floor, a distance of 30ft ?

Question 4: (30pts): problem 19 page 489. The base of a solid is a circular disk with radius 3 . Find the volume of the solid if parallel cross-sections perpendicular to the base are isosceles right triangles with hypotenuse lying along the base.

Question 5: (30pts): problem 17 page 459. Use Left Riemann sums with $n = 5$ to estimate the arc length of the curve. And explain if its overestimate or underestimate. $y = e^x, \quad 0 \leqslant x \leqslant 10$

Question 6: (30pts): . If f is continuous and $\int_1^3 f(x)dx = 8$, show that f takes on the value 4 at least once on the interval $[1, 3]$.

Question A. tank is full of water. Find the work required to pump the water out of the spout. (density of water is 1000 $\frac{kg}{m^3}$

6 ft

8 ft

3 ft

frustum of a cone