

You may keep this page of questions. Turn in your answers with all of your work on the colored paper. NO calculators are allowed on THIS exam.

(1) 12 Points. Analyze and evaluate  $\int_5^{\infty} \frac{1}{t^2 + 25} dt$ .

(2) 20 Points. Find the volume of the solid of revolution that is generated by revolving the region bounded by  $x = 1$ ,  $x = 2$ ,  $y = 0$  and  $y = 4/x^2$  about the  $y$ -axis.

(3) 15 Points. Find the **exact** value for the arc length of the curve  $y = 4x^{3/2}$  between  $x = 1/4$  and  $x = 1$ .

(4) 16 Points. Find the area of the region in the  $xy$ -plane that is outside the circle having polar equation  $r = 1$ , but is inside the circle having equation  $r = 2 \cos \theta$ .

(5) 25 Points.

Find the mass,  $M$ ,

the moment  $M_x$  with respect to the  $x$ -axis,

the moment  $M_y$  with respect to the  $y$ -axis and

the center of mass  $(\bar{x}, \bar{y})$  for the plane region bounded by

$$x = 4y - y^2 \quad \text{and} \quad x = y$$

if this region has constant density  $\delta = 1$ .

(6) 12 Points. A certain spring has a natural length of 0.400 meters and exerts a force of 6.00 newtons when it is stretched to the length of 0.700 meters. How much work (in joules) is done in stretching this spring from 0.400 meters to 0.500 meters?