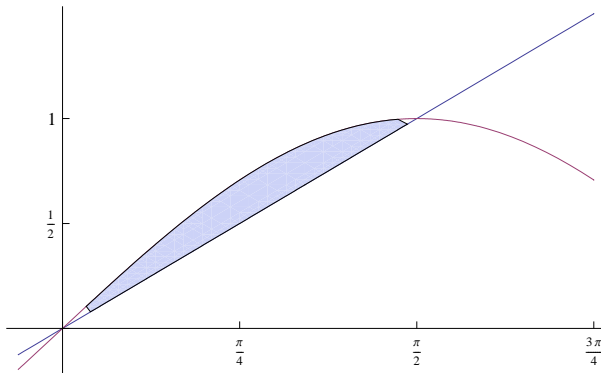


1. (8 points) Calculate the following integrals:

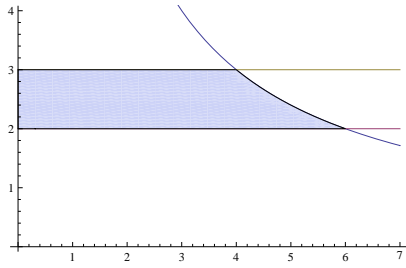
(a) (4 points) $\int_0^{\pi/2} (\sin \theta \cos^3 \theta) d\theta$.

(b) (4 points) $\int 5e^{3t} + 2 dt$.

2. (8 points) Calculate the area in the region between $y = \frac{2x}{\pi}$ and $y = \sin x$ shown below:



3. (8 points) Calculate the volume of the solid produced by rotating the region bounded by the y -axis, $y = \frac{12}{x}$, $y = 2$, and $y = 3$ around the y -axis.



4. (2 point bonus) Calculate the volume of the solid produced by rotating the region shown in the above problem around the x -axis.