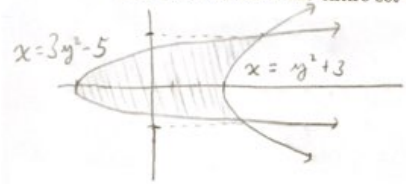
Calculus II. Quiz 1. Name Key
Show all work on this page for full and/or partial credit. Time

1. Find the area between the curves $y^2 = x - 3$ and $3y^2 = x + 5$. You may use a calculator, but make sure to show the entire set-up in order to get credit.



Type II: dy

Find intersections:

$y^2+3 = 3y^2-5$

$\Rightarrow 8 = 2y^2$

$\Rightarrow y^2 = 4$

$\Rightarrow y = \pm 2$

$$\boxed{A = \int_{-2}^{2}\left(\left(y^2+3\right) - \left(3y^2-5\right)\right)dy}$$

$$= \int_{-2}^{2}\left(8-2y^2\right)dy$$

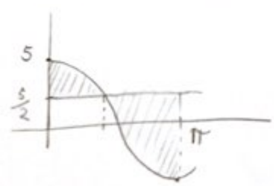
$$= \left[8y - \frac{2y^3}{3}\right]_{-2}^{2}$$

OR use symmetry

$$A = 2\int_0^2\left(y^2+3-\left(3y^2-5\right)\right)dy$$

$$= 16 - \frac{16}{3} - \left(-16 - \frac{-16}{3}\right) = 32 - \frac{32}{3} = \boxed{\frac{64}{3}} = 21.33$$

2. Find the area between $y = 5/2$ and $y = 5\cos x$ for $0 \le x \le \pi$. You may use a calculator, but make sure to show the entire set-up in order to get credit.



Type I: dx

Intersection:

$\frac{5}{2} = 5\cos x$

$\Rightarrow \cos x = \frac{1}{2}$

$\Rightarrow x = \pi/3$

$$\boxed{A = \int_0^{\pi/3}\left(5\cos x - \frac{5}{2}\right)dx + \int_{\pi/3}^{\pi}\left(\frac{5}{2} - 5\cos x\right)dx}$$

$$= \left[5\sin x - \frac{5}{2}x\right]_0^{\pi/3} + \left[\frac{5}{2}x - 5\sin x\right]_{\pi/3}^{\pi}$$

$$= 5\frac{\sqrt{3}}{2} - \frac{5\pi}{6} - (0-0) + \frac{5\pi}{2} - 0 - \left(\frac{5\pi}{6} - 5\frac{\sqrt{3}}{2}\right) = \boxed{5\sqrt{3} + \frac{5\pi}{6}}$$

$= 11.2782$

① I

$$\int_0^a\left(f(x) - g(x)\right)dx$$

② I

$$\int_0^b\left(h(x) - f(x)\right)dx$$

③ II

$$\int_c^0\left(g(y) - k(y)\right)dy$$