

Show all work and circle/box your final answer. All answers must be simplified unless stated otherwise.

(1) Find the following integrals:

(a)  $\int_0^{\pi/4} \frac{2 \sin x}{\cos^2 x} dx$

(b)  $\int_0^{\pi/4} \tan^4 x \sec^2 x dx$

(c)  $\int_4^5 2x\sqrt{x^2 - 16} dx$

(d)  $\int_0^{\sqrt{2}} \frac{x}{\sqrt{1+x^2}} dx$

(2) Find the total area between the  $x$ -axis and  $f(x) = 9 - x^2$  on the interval  $[0, 6]$

(3) Find the area between the following two curves:

(a)  $y = x^2$  and  $y = x^3$

(b)  $y = x^2$  and  $y = \frac{1}{x^2}$  from  $x = \frac{1}{2}$  to  $x = 4$