

Quiz 6

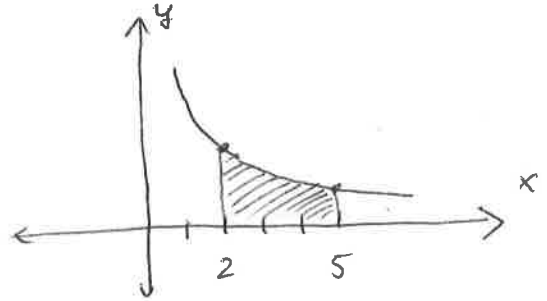
Name: key Row: _____

1. Use integration to find the area underneath the graph of $y = 1/x^2$, above the line $y = 0$, and between the lines $x = 2$ and $x = 5$.

[6] $A = \int_2^5 \frac{1}{x^2} dx$ (2)

$$= \int_2^5 x^{-2} dx = \left[\frac{x^{-1}}{-1} \right]_2^5$$

$$= \left[-\frac{1}{x} \right]_2^5 = -\frac{1}{5} - \left(-\frac{1}{2}\right) = \frac{1}{2} - \frac{1}{5} = \boxed{\frac{3}{10}}$$
 (2)



2. Use integration by substitution to find the integrals, showing all work.

[6] a. $\int (\cos x) \sqrt{5 \sin x + 7} dx$

$u = 5 \sin x + 7$
 $du = 5 \cos x dx$

$dx = \frac{1}{5 \cos x} du$

$$= \int \sqrt{u} \cos x \cdot \frac{1}{5 \cos x} du$$

$$= \frac{1}{5} \int \sqrt{u} du$$

$$= \frac{1}{5} \int u^{1/2} du$$

$$= \frac{1}{5} \cdot \frac{2}{3} u^{3/2} + C = \boxed{\frac{2}{15} (5 \sin x + 7)^{3/2} + C}$$

[8] b. $\int x^5 (x^3 + 1)^{10} dx$

$u = x^3 + 1$
 $du = 3x^2 dx$
 $\frac{1}{3x^2} du = dx$

$$= \int x^5 u^{10} \frac{1}{3x^2} du$$

$$= \frac{1}{3} \int x^3 u^{10} du$$

$$= \frac{1}{3} \int (u-1) u^{10} du$$

$$= \frac{1}{3} \int (u^{11} - u^{10}) du = \frac{1}{3} \left[\frac{u^{12}}{12} - \frac{u^{11}}{11} \right] + C$$

$= \frac{1}{3} \left[\frac{(x^3+1)^{12}}{12} - \frac{(x^3+1)^{11}}{11} \right] + C$