

Question 1: Evaluate the following integrals:

(a)  $\int \sin^3(x) \cos^2(x) dx$

[5]

(b)  $\int \tan^4(x) \sec^4(x) dx$

[5]

Question 2: Evaluate the integral

$$\int \frac{x^2}{\sqrt{9-x^2}} dx$$

Question 3: Evaluate the integral

$$\int \frac{6}{x^3 + x^2 - 2x} dx$$

[10]

Question 4: Evaluate the following integrals:

(a)  $\int x^3 \sqrt{x^2 + 25} dx$

[3]

(b)  $\int \frac{x^3}{x^2 - 1} dx$

[3]

(c)  $\int \cos^2(\pi t) dt$

[4]

Question 5: Use the trapezoid rule with  $n = 4$  to approximate  $\int_0^2 \left( x^4 - \frac{x^3}{2} \right) dx$

[5]

Question 6: The function  $f(x)$  has the following values:

$x$	0	1/2	1	3/2	2
$f(x)$	-4	2	-2	$a$	-6

Notice in this table that  $f(3/2) = a$ . Using all of the data above and Simpson's Rule resulted in the approximation  $\int_0^2 f(x) dx \approx 1$ . Determine the value of  $a$ .

[5]