

# Final Exam Online Review

December 15, 2022 10:23 PM

Evaluate the definite integral

$$\int_1^5 \frac{10x^2 + 9}{\sqrt{x}} dx$$

$$\int_1^5 \frac{10x^2 + 9}{x^{1/2}} dx = \frac{10x^{2-1/2}}{2-1/2} + \frac{2 \cdot 9x^{1/2}}{1/2} + C$$

$$= 10x^{3/2} + 18x^{1/2} = \frac{10x^{3/2}}{3/2} + \frac{18x^{1/2}}{1/2} + C$$

$$\left. \frac{20x^{5/2}}{5} + 18x^{1/2} \right|_1^5 = \left[ \frac{20(5)^{5/2}}{5} + 18(5)^{1/2} \right] - \left[ \frac{20(1)^{5/2}}{5} + 18(1)^{1/2} \right]$$

$$= 263.856 - 22 = 241.856$$

Evaluate the indefinite integral.

$$\int x^4 \sqrt{15 + x^5} dx$$

$$\int x^4 \sqrt{15 + 5x^4} \rightarrow \frac{1}{5} \int \sqrt{u} u^{3/2} = \frac{1}{5} \int \frac{2u^{3/2}}{3/2} = \frac{2u^{5/2}}{15}$$

$$\int x^4 \sqrt{\frac{15+x^5}{5}} u^{3/2} = \frac{2u^{5/2}}{15} + C = \frac{2(15+x^5)^{5/2}}{15} + C$$

The function  $f(x) = 2x^3 - 33x^2 + 168x + 3$  has derivative  
 $f'(x) = 6x^2 - 66x + 168$ .

$f(x)$  has one local minimum and one local maximum.

$f(x)$  has a local minimum at  $x$  equals

with value

and a local maximum at  $x$  equals

with value

Compute the given integral.

$$\int x^5 \ln x dx = \text{[ ]} + C$$

Evaluate the integral:  $\int_0^\infty 6xe^{-x/3} dx$

Evaluate the definite integral.

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



Water is being pumped into an inverted conical tank at a rate of **13.8** cubic meters per min.

The tank has height **10** meters and the diameter at the top is **7** meters.

Find the rate at which the water level is rising when the height of the water is **4.5** meters.

$\frac{\text{m}}{\text{min}}$

Use the substitution  $x = 7 \tan(\theta)$  to evaluate the indefinite integral

$$\int \frac{34dx}{x^2\sqrt{x^2+49}} = \text{  } + C$$