

Tue 9

Name: Solutions

ID Number: _____

1. Compute the derivative of the function

$$f(x) = 3 \cos(2x^2) + 3(\sin(2x))^2$$

$$f'(x) = -12x \sin(2x^2) + 12 \sin(2x) \cos(2x)$$

2. Evaluate

$$\int_0^{2\pi} \sin x \cos x dx$$

Using:

$$\int_{x=0}^{x=2\pi} 2u du$$

$$= \left. \frac{2}{2} u^2 \right|_{x=0}^{x=2\pi}$$

$$= \left. \frac{(\sin x)^2}{2} \right|_0^{2\pi} = 0$$

$$u = \sin x$$

$$du = \cos x dx$$

$$u = \cos x$$

$$du = -\sin x dx$$

$$-\left. \frac{(\cos x)^2}{2} \right|_0^{2\pi} = -\left[\frac{1}{2} - \frac{1}{2} \right] = 0$$

Tue 10

Name: _____

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1. Compute the derivative of the function

$$f(x) = x \cos 2x - \frac{\sin x}{\cos x}$$

$$\begin{aligned} f'(x) &= \cos 2x - x(\sin 2x) \cdot 2 - \frac{\cos' x + \sin' x}{\cos^2 x} \\ &= \cos 2x - 2x \sin 2x - \sec^2 x \end{aligned}$$

2. Evaluate

$$\int_0^{2\pi} x^2 \sin x^3 dx$$

$$\begin{aligned} \text{let } u &= x^3 \\ du &= 3x^2 dx \end{aligned}$$

$$= \frac{1}{3} \int_0^{(2\pi)^3} \sin u du = -\frac{1}{3} [\cos u]_0^{(2\pi)^3} = -\frac{1}{3} [\cos(2\pi)^3 - 1] = .6636$$

Tue 11

Name: _____

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1. Compute the derivative of the function

$$f(x) = \sqrt{3 \sin x + \sin 3x}$$

$$f'(x) = \frac{1}{2} (3 \sin x + \sin 3x)^{-\frac{1}{2}} (3 \cos x + 3 \cos 3x)$$

2. Evaluate

$$\int \frac{1}{x} \sin x dx$$

$$u = x$$

$$du = dx$$

$$dv = \sin x$$

$$v = -\cos x$$

$$-x \cos x + \int \cos x dx$$

$$= -x \cos x + \sin x$$

$$-x \cos x + \sin x \Big|_0^{2\pi} = -2\pi + 0 - (0 + 0) = -2\pi$$

$$\int_0^{2\pi} x \sin x dx$$