Calculus II - Quiz 3 - Answers

Name:_____ Box #_____

1. Compute the following definite integrals, show the steps.

$$\int_{-1}^{2} \frac{2x^2 - x^3}{5} dx = \frac{1}{5}\left[\frac{2}{3}x^3 - \frac{x^4}{4}\right]_{-1}^{2} = \frac{1}{5}\left(\frac{2}{3}2^3 - \frac{2^4}{4} + \frac{2}{3} + \frac{1}{4}\right) = \frac{9}{20}.$$

2.

$$\begin{aligned}\int_{-\pi/2}^{\pi/2} (4\cos t - 3\sin 2t)\, dt &= \left[4\sin t + \frac{3}{2}\cos 2t\right]_{-\pi/2}^{\pi/2} \\ &= 4\sin\frac{\pi}{2} + \frac{3}{2}\cos\pi - 4\sin\frac{-\pi}{2} - \frac{3}{2}\cos(-\pi) \\ &= 4 - \frac{3}{2} + 4 + \frac{3}{2} = 8.\end{aligned}$$

3.

$$\int_0^T \frac{e^{ax} + e^{-ax}}{2} dx = \left[\frac{e^{ax} - e^{-ax}}{2a}\right]_0^T = \frac{e^{aT} - e^{-aT}}{2a} - \frac{1-1}{2a} = \frac{e^{aT} - e^{-aT}}{2a}.$$

4.

$$\int_5^{10} \frac{2dy}{y} = [2\ln y]_5^{10} = 2\ln 10 - 2\ln 5 = 2\ln\left(\frac{10}{5}\right) = 2\ln 2.$$

5. A particle is moving along the real line with a velocity of $v(t) = 2 - 5t$ cm/sec starting a $t = 2$. Write down an **definite integral** expression for the displacment of the particle in the next 3 seconds. What is the displacement.

$$\text{displacement} = \int_2^5 (2 - 5t)\, dt = \left[2t - \frac{5}{2}t^2\right]_2^5 = 10 - \frac{125}{2} - 4 + \frac{20}{2} = -\frac{93}{2}.$$