Notes - Chapter 3 Review

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1 Warm-up

1. Let $f(x) = \frac{1}{k}\cos(kx)$. For what value of k does f have a period of 3?
Consider the basic form of a sinusoidal function:

$$y = A\sin(B(x - C)) + D$$

Remember that the period of a sinusoidal is given by:

$$Period = \frac{2\pi}{b}, \quad b = k \tag{1}$$
$$= 3 \tag{2}$$

Solving for k:

$$k = \frac{2\pi}{3} \tag{3}$$

2. The slope of the tangent line to the curve $f(x) = xy^3 + y^2x^2 = 6$ at (2, 1) is:

$$f'(x) = y^3 dx + x3y^2 dy + 2yx^2 dy + 2xy^2 dx = 0 \tag{1}$$
$$3xy^2 dy + 2yx^2 dy = -2xy^2 dx - y^3 dx \tag{2}$$
$$= \frac{-(2xy^2 + y^3)}{3xy^2 + 2yx^2} \tag{3}$$

At (2, 1), the slope is

$$= \frac{-(2(2)(1)^2) + (1)^3}{3(2)(1)^2 + 2(1)(2)^2} \tag{4}$$
$$= \frac{-5}{14} \tag{5}$$

2 Chapter 3 Review - Free Response

2.1 1. p186 33, p242 24, p244 78 (identify increasing and decreasing intervals)

2.2 p187

3 Chapter 3 Review - Multiple Choice

3.1 16. p241 34

The total stopping distance T of a vehicle is $T = 2.5x + 0.5x^2$ where T is in feet and x is the speed in miles per hour. Approximate the change and percent change in total stopping distance as speed changes from $x = 25$ to $x = 26$ miles per hour.

  1. $\Delta x = dx = 26 - 25 = 1$

2. x=25

$$f(x + \Delta x) \approx f(x) + f'(x)\Delta x \tag{6}$$

$$dT = (2.5 + x)dx = (2.5 + 25)(1) = 27.5mi \tag{7}$$

$$\text{Percentage change} = \frac{dT}{T} = \frac{27.5}{375} \approx 7.3\% \tag{8}$$