

Applied Calculus I Practice Problems for Quiz # 3

1. Evaluate the following expressions:

- (a). $\cos(\tan^{-1}(\frac{5}{9})) =$
- (b). $\tan(\sin^{-1}(\frac{\sqrt{3}}{2})) =$
- (c). $\sin(\frac{20\pi}{3}) =$
- (d). $\sec(\cos^{-1}(\frac{2}{3})) =$

2. The intensity of radiation, I , oscillates sinusoidally between a low of 100 and a high of 1200. The time between one peak and the next peak is 5 minutes. At time 30 seconds after noon today, the radiation level is measured to be 650, and it is rising. Write the function $I(t)$ for intensity as a function of t , the number of seconds after noon today.

3. Find the asymptotes for the following function:

$$y = \frac{2x^2 + 11x + 6}{x + 18}$$

- (a). Vertical:
- (b). Horizontal:
- (c). Sketch a plot of $y(x)$

4. Find the asymptotes for the following function:

$$y = \frac{x^2 - x + 6}{x^3 - 1}$$

- (a). Vertical:
- (b). Horizontal:
- (c). Sketch a plot of $y(x)$

5. Find the asymptotes for the following function:

$$y = \frac{x^2 - x + 1}{x^2 - 4}$$

- (a). Vertical:
- (b). Horizontal:
- (c). Sketch a plot of $y(x)$

6. For what values of the constants b and c is the function f continuous on $(-\infty, \infty)$, where

$$f(x) = \begin{cases} cx + b & \text{if } x \in (-\infty, 2] \\ b + x & \text{if } x \in (2, 5) \\ cx^2 & \text{if } x \in [5, \infty) \end{cases}$$

7. The height (in meters) of a particle moving along a vertical line is given by $h(t) = 100t^2 - 50$, where t is measured in seconds.

- (a). Find the average velocity of the particle over the time interval $[2, 5]$.
- (b). Find the instantaneous velocity of the particle when $t = 4$.

8. Evaluate the limit

$$\lim_{x \rightarrow -1} \frac{x^2 + 3x + 2}{x + 1}$$

9. Let

$$f(x) = \begin{cases} x + 4 & \text{if } x \leq -2 \\ 2x^2 + 3 & \text{if } x > -2 \end{cases}$$

Sketch the plot of $f(x)$ and determine the following limits, if they exist:

- (a). $\lim_{x \rightarrow -2^-} f(x)$
- (b). $\lim_{x \rightarrow -2^+} f(x)$
- (c). $\lim_{x \rightarrow -2} f(x)$