Dr. Tabanli's Exam #2 Review for Sections 13-15, 21-23

1. Consider the function $f(\mathrm{x}) = \dfrac{(ax+2)(x-1)}{(x-2)}$, where a is an unspecified constant.

   (i) For which of the following values of a does f have a horizontal asymptote?

   (a) $a = 0$ only$a = 0$ only
   (b) $a = 6$ only
   (c) $a = 2$ only
   (d) $a = 1$ only
   (e) f has a horizontal asymptote for no value of a
   (f) f has a horizontal asymptote for all values of a
   (g) there is not enough information to determine
   (h) none of the above

   (ii) Give the equation(s) of the horizontal asymptote if/when it exists.

2. Let $h(x) = \sqrt{3f(x)}$ and the equation of the tangent line to $f(x)$ at $x = 1$ is $y = 9 + 3(x + 1)$. Find $h'(1)$.

3. Suppose $R(x) = 3x + 8$, $B(2) = 3$, $\left.\dfrac{dB}{dx}\right|_{x=2} = -2$, $Q(x) = \dfrac{R(x)}{B(x)}$, find $Q'(2)$.

4. Suppose a is an unspecified constant and $f(x) = x - 2a \cdot \cos x$ has a horizontal tangent at $x = \dfrac{3\pi}{2}$, find the value(s) of a.

5. Determine the constants b and c such that the line tangent to $f(x) = x^2 + bx + c$ at $x = 1$ is $y = 4x + 2$.

6. Find the value of k that makes f continuous at $x = -3$ or determine that no such value of k exists. If there is no k value exists, write "DNE".

$$f(x) = \begin{cases} \sqrt[3]{1-x^2} + k & , \quad x > -3 \\ \frac{x}{2} \cdot \sin(\frac{\pi}{2} \cdot x) & , \quad x = -3 \\ 2x + kx^2 & , \quad x < -3 \end{cases}$$

7. **True or False** For linear functions, the slope of any secant always equal to the slope of any tangent line.

8. **True or False** The slope of a line tangent to $f(x) = e^x$ is never 0.

9. **True or False** $\dfrac{d(e^3)}{dx} = 3e^2$.

10. **True or False** The function $\sec x$ is not differentiable at $x = \dfrac{\pi}{2}$.

11. **True or False** A rational function is continuous for all x.

12. **True or False** The graph of a function can have any number of horizontal asymptotes.

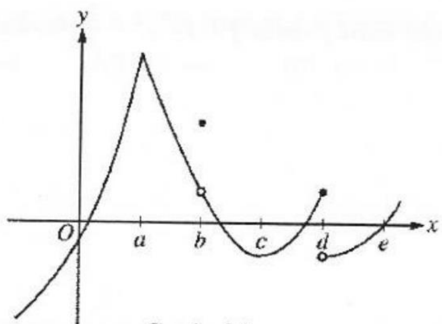
13. Use the graph of f in the figure below to answer the questions:

    (a) Determine the values of x in the interval $(0, e)$ at which f fails to be continuous.

    (b) Determine the values of x in the interval $(0, e)$ at which f fails to be differentiable.

    (c) Determine the sign of the slope of the curve at the following points as negative, positive and identify where the slope is zero.

    - $x = \frac{a}{2}$
    - $x = \frac{a+b}{2}$
    - $x = c$



Graph of f