PRINCE SULTAN UNIVERSITY

Business Calculus MATH 211

First Major Exam

NAME _____ ID _____

Q1. Find the equation for the line through (3, -1) and (2, 1).

Q2. Let $f(x) = \dfrac{2}{\sqrt{x^2 - 1}}$ and $g(x) = 2x + 3$.

a) Evaluate $g \circ f(-2)$

b) Find the domain of *f(x)*.

Q3. At a certain factory, the total cost of manufacturing q units during the daily production run is $C(q) = q^2 + 2q + 297$ dollars. On a typical workday, $q(t) = 17t$ units are manufactured during the first t hours of a production run.

a) How many dollars are spent during the first 3 hours of production?

b) How many dollars are spent during the 3rd hour of production?

Q4. Evaluate the following limits

a) $\lim\limits_{x \to 4} \dfrac{x^2 - 16}{\sqrt{x} - 2}$

b) $\lim\limits_{x \to \infty} \dfrac{x^2 - 3}{-x^3 + 5}$

Q5. Suppose that when the price of a certain commodity is p dollars per unit, then x hundred units will be purchased by consumers, where $p = -0.05x + 38$. The cost of producing x hundred units is $C(x) = 0.02x^2 + 3x + 574.77$ hundred dollars.
Determine the level of production x that result in maximum profit.

Q6. Find the derivative of the function

a) $y = 2x^3 - 3\sqrt{x} + 4x^{-1} + 2$

b) $y = \dfrac{x^3 - 5}{x^3 + 9}$

Q7. Find the slope of the tangent line to the curve $y = (x^2 - 3)(2x + 1)$ at x = 1.

Q8. The manager of a jewelry store models total sales by the function $S(t) = \dfrac{2000t}{4 + 0.3t}$ where t is the time (years) since the year 2000 and S is measured in thousand dollars.

a) At what rate are sales changing in the year 2002?

b) What happens to sales in the long run (that is when $t \to \infty$)?