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Fraser International College
Test 2 Version A
Math 157 Sec 2
November 23, 2021 Time 60 Minutes
Instructor: Dr. N. Tariq

- **Please ensure that you sign your exam above to certify your identity. Unsigned exams will not be marked.**
- **Use only calculators Sharp EL-510 RNB and Sharp EL-531 XGB-WH. However, other models of Sharp calculators are also accepted as long as they do not have any graphing, differentiation or integration capabilities.**
- **The duration of the exam is 60 minutes.**
- **DO NOT OPEN this test booklet until you are told to do so.**
- **Please check that you have all 5 questions of the exam.**
- **Do ALL your work in this test booklet. You may use the backside of each page for scrap work.**
- **The value of each question is shown at the end of each question.**

Question	Score	Maximum
1		6
2		5
3		5
4		10
5		4
Total		30

1. **Differentiate the following functions as indicated. [6 marks]**

a) $f(x) = cos(3x) + \tan(2x) + e^x + ln|1 - 2x|, find\ f'(0).$

b) $f(x) = \sqrt{5x - 5}^{\sqrt{(5x-5)}}$, **find** $f'(6)$.

$e^{2x} - 1 \neq 0$

$e^{2x} \neq 1$

$2x \neq 0$

$x \neq 0$

$x = 0$ V.A

$\lim_{x \to \infty}$

$\lim_{x \to \infty} \frac{1e^{2x}}{e^{2x} - 1}$ H.O.P.

$= \lim_{x \to \infty} \frac{12e^{2x}}{e^{2x}}$ $\frac{\infty}{\infty}$ N.D. I.D.

2. The price p (in dollars) and the demand q for a product are related by

$$25p^2 + 4q^2 = 20000 \qquad 0 < p < 28. \text{ [5 marks]}$$

(a) Find an expression for $E(p)$ (the elasticity of demand). [3 marks]

(b) If the current price per unit is \$8, will revenue increase or decrease if the price is raised slightly? Explain. [2 marks]

3. (a) Find the linearization $L(x)$ of $f(x) = 2x^3 - 7x^2 + 9x + 6$ at $a = 2$. [3 marks]

(b) Use $L(x)$ to approximate $f(1.8)$. [2 marks]

4. Let $f(x)=\frac{2x^2+1}{(x-1)^2}$, $f'(x)=\frac{-2(2x+1)}{(x-1)^3}$ and $f''(x)=\frac{2(4x+5)}{(x-1)^4}$. [10 marks]

a) State the domain of f .

b) Find the x –intercept(s) of f , if any.

c) Find the y – intercept of f , if any.

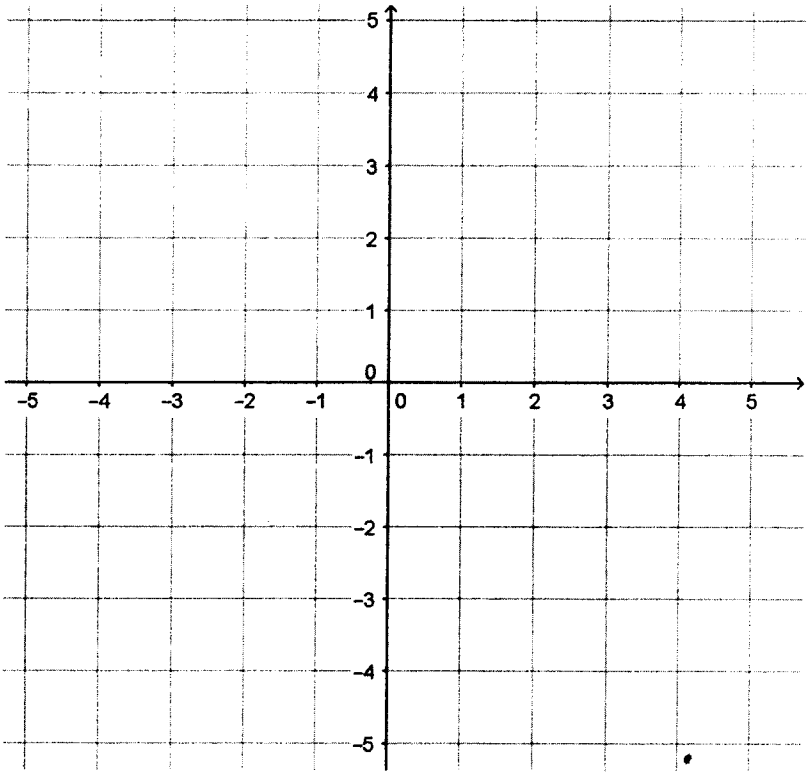
d) Find the equations of all horizontal asymptote(s) of f .

[e) Find the equations of all vertical asymptote(s) of f .

f) Find the intervals where f is increasing or decreasing and the points of relative extrema.

g) Find the intervals where the function f is concave upward or downward and the points of inflection.

[h) Using the above information, sketch the graph of f .



5.A rock is thrown into a still pond. The circular ripples move outward from the point of impact of the rock so that the area of the circle formed by a ripple increases at the rate of $12\pi\ m^2$ per minute. Find the rate at which the radius is changing at the instant the area is $36\pi\ m^2$. [4 marks]