FIN

CALC

Student Nan

Student I.D.

Instructor:

Time: 3 hou

Instructions:

- Print your n
- All question
  provided. Sh
- A Sharp EL-

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1. (16 marl

Evaluate the fol

(a) $\lim\limits_{x\to 5} \dfrac{x^2 +}{x^2 -}$

$= \lim\limits_{X\to 5}$

(b) $\lim\limits_{x\to 3} \dfrac{\sqrt{3x}}{3}$

$= \lim\limits_{X\to 3}$

$= \lim\limits_{X\to 3}$

$= \dfrac{-3}{\sqrt{3(3)-5}}$

1. (continued)

(c) $\lim_{x\to 6^-} \dfrac{3x^2-18x}{|x-6|}$

If $x \to 6^-$, $x<6$, so $x-6<0$

so $|x-6| = -(x-6)$

$$\lim_{x\to 6^-} \frac{3x^2-18x}{|x-6|} = \lim_{x\to 6^-} \frac{3x(x-6)}{-(x-6)} = \lim_{x\to 6^-} (-3x)$$

$$= -3(6) = \boxed{-18}$$

(d) $\lim_{x\to -\infty} \dfrac{2x^3-x^2+8}{x(5-x^2)}$ $= \lim_{x\to -\infty} \dfrac{2x^3-x^2+8}{5x-x^3} \cdot \dfrac{\left(\frac{1}{x^3}\right)}{\left(\frac{1}{x^3}\right)}$

$$= \lim_{x\to -\infty} \frac{2-\frac{1}{x}+\frac{8}{x^3}}{\frac{5}{x^2}-1} = \frac{2-0+0}{0-1} = \boxed{-2}$$

2.

Find

(a)

f'

=

=

=

(b)

f'(

=

=

2. (c

(c) $f($

$f'(x$

=

=

=

=

(d) $f($

$f'(x)$

=

=

3. (4 r

Use only t

Importar

$f'(x)$

$= \lim_{h}$

$= \lim_{h \to}$

$= \lim_{h \to}$

$= \lim_{h}$

$= \sqrt{1}$

4. (8 mark

(a) Find the

$f'(x) =$

The slope o

$m_t = f'($

So, using p
tangent line

(b) Find the
point (2,

$f'(x) = \frac{d}{d}$

$=$

at (2,1)

so the s

The equation

$y - 1 = \frac{9}{2}x$

[illegible]

7.

For t

(i

(i

(i

(i

(v

(v

Use

Note

(i) f

f

(ii) Hori

$\lim_{x\to\infty} f($

$\lim_{x\to -\infty}$

So

Verti

$\lim_{x\to 2^-} f(x$

$\lim_{x\to 2^+} f(x$

So

[illegible]

8. (6 m

An electric

s) accordin

If the elect

the power

Hint: simpl

The power

$P = i^2 R$

$P(t) =$

$P'(t) =$ (

so $P'($

If $0 < t < 2$,

If $t > 2$,

so $P(t)$

The power

10. (8 marks)

Evaluate the following de

(a) $\int_1^3 \left(5 + \frac{2}{x} - \frac{1}{x^2}\right)$

$\int \left(5 + \frac{2}{x} - \frac{1}{x^2}\right) d$

$= 5x + 2\ln|x|$

So $\int_1^3 \left(5 + \frac{2}{x} -\right.$

$= \left[5(3) + 2\ln(3)\right.$

$= 15 + 2\ln 3 +$

(b) $\int_0^1 (2x^3+1)\ \sqrt{x^4+2}$

Let $u = x^4 + 2x +$

$\int (2x^3+1)\sqrt{x^4+2x+1}$

$= \frac{1}{2}\frac{u^{3/2}}{\left(\frac{3}{2}\right)} = \frac{1}{2}$

so $\int_0^1 (2x^3+1)\sqrt{x^4+}$

$= \frac{1}{3}(1+2+1)^{3/2}$

$= \frac{1}{3}(8) - \frac{1}{3}$

11. (6 marks)

A 120-μF capacitor initia
t=0), a current $i(t) = 6$
through the circuit conta
the capacitor to reach 15

$$V_c = \frac{1}{C} \int i \, d$$

$$= 500 \int t$$

At $t = 0$, V_c

$$\boxed{V_c = }$$

We must find

$$150 =$$

$$250$$

The voltage ac
in 0.45 secon