(70 pts.)

MAC 2233 EXAM I (MWF) MR. NADEL FALL 2011

(10) ① a) If $f(x) = x^2 + 2$ find and simplify $f(x^2+2)$.

b) Find the domain of $g(x) = \sqrt{3x+5}$

(10) ② a) If an expenditure function is given by $E(p) = p(24-p)$ where p is unit price, sketch graph of E. Include vertex and intercepts. (x,y)

b) Find points of intersection to 2 decimal place accuracy of $y = x^2$ and $y = x+5$

(10) ③ a) Find the equation of the line through $(1,-4)$ and parallel to $2x+y=4$, in $y = mx+b$ form.

b) 0° Celsius is equal to 32° Fahrenheit. 100° Celsius is 212° Fahrenheit. Write a linear equation expressing C in terms of F.

(10) ④ a) A rectangular area of 4,000 sq. ft is fenced on 3 sides not adjacent a highway. Express the no. of ft. of fencing as a function of the length of the unfenced side.

b) A profit function is $P(x) = -200x^2 + 2600x - 6000$ where x = no. of units. What value of x gives the maximum profit, and what is the maximum profit?

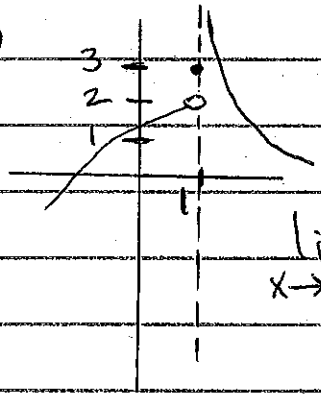
(15) ⑤ a) $\lim_{x \to -\infty} \frac{2x^3 - 4x}{5x^2 + x + 1}$

b) $\lim_{x \to 2} \frac{x^4 - 16}{x - 2}$

c) $\lim_{x \to \infty} \frac{2x^3 + 5x - 1}{7x^3 + 2x + 4}$

(15) ⑥ a) $\lim_{x \to 2^-} \frac{1}{x-2}$

b) Where is $f(x) = \frac{x^2 - 2x - 3}{x^2 - 1}$ not continuous?

c) 

$y = f(x)$ is graphed. Find $\lim_{x \to 1^-} f(x)$ and $\lim_{x \to 1^+} f(x)$

(next column)

MAC 2233 EXAM I KEY (F '11

(1)a) $f(x^2+2)=(x^2+2)^2+2$

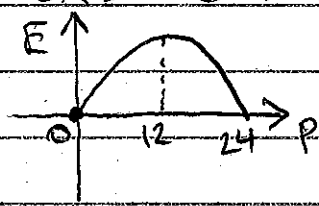
$=x^4+4x^2+4+2$

$=x^4+4x^2+6$

b) $3x+5\geq 0$

$3x\geq -5 \Rightarrow x\geq -\frac{5}{3}$

(2) a)



$E(12)=12(24-12)=144$

b) $x^2=x+5$

$1x^2-1x-5=0$

$x=\frac{1\pm\sqrt{1-4(1)(-5)}}{2}$

$x=\frac{1\pm\sqrt{21}}{2}$

$(2.79, 7.79)$ $(-1.79, 3.21)$

(3) a) $y=-2x+4$, $m=-2$

$y+4=-2(x-1)$

$y=-2x+2-4$

$y=-2x-2$

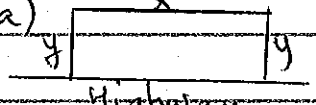
b) (F, C) (32, 0) (212, 100)

$m=\frac{100}{180}=\frac{5}{9}$

$C-0=\frac{5}{9}(F-32)$

$C=\frac{5}{9}(F-32)$

(4) a)



$F=x+2y$

$xy=4000$

$y=\frac{4000}{x}$

$F=x+2\left(\frac{4000}{x}\right)=x+\frac{8000}{x}$

(4)b) $x=-\frac{b}{2a}=\frac{-2600}{-400}=6.5$

$P_{max}=-200(6.5)^2+2,600(6.5)-6000$

$=2450$

(5)a) $\lim_{x\to-\infty}\left(\frac{2x^3}{5x^2}\right)=\lim_{x\to-\infty}\left(\frac{2x}{5}\right)=-\infty$

b) $\lim_{x\to 2}\frac{(x^2+4)(x+2)(x-2)}{(x-2)}$

$=(8)(4)=32$

c) $\frac{2}{7}$

(6)a) $\frac{1}{0^-}=-\infty$

b) $x^2-1=0 \Rightarrow x=\pm 1$

c) $\lim_{x\to 1^-} f(x)=2$

$\lim_{x\to 1^+} f(x)=\infty$