

(70 pts.)

MAC 2233

EXAM I (MWF)

MR. NADEL SPRING 2010

(b) ① a) If $f(u) = u^2 - 3u + 1$
find and simplify $f(x-1)$.

b) Find the domain of

$$g(x) = \frac{x-3}{x+2}$$

(b) ② a) Sketch $y = x^2 + 2x + 1$.

Include vertex, and any intercepts.

b) Find all points of intersection of $2x - 3y = 7$ and $x + y = 1$. Use algebra.

(b) ③ a) Find the equation of the line through $(1, -5)$ and $(-2, 3)$ in $y = mx + b$ form.

b) A manufacturer's total cost consists of a fixed overhead of \$7,000 plus production costs of \$45 per unit.

Express the total cost as a function of the no. of units produced and draw the graph.

(b) ④ a) A can is to have a volume of 24π cubic inches. The cost for the top and bottom is 4¢ per sq. inch, and for the curved side is 3¢ per sq. inch.

Express the cost of the can in terms of its radius.

$$(V = \pi r^2 h, \text{ lateral surface area} = 2\pi r h)$$

b) The product of 2 numbers is 216. Express the sum of the numbers as a function of the first number.

(15) ⑤ a) $\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{x - 4}$

b) $\lim_{x \rightarrow -\infty} \frac{-2x^2 - 4x + 1}{5x^2 + 3}$

c) $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2}$

Hint: $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

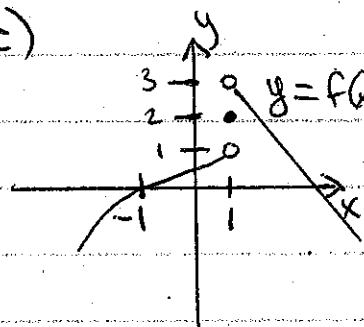
(15) ⑥ a) $\lim_{x \rightarrow 3^+} \frac{1}{3-x}$

b) Where is

$$f(x) = \frac{x^2 - 4}{x^2 - x - 2}$$

not continuous?

c)



Find $\lim_{x \rightarrow 1^-} f(x)$

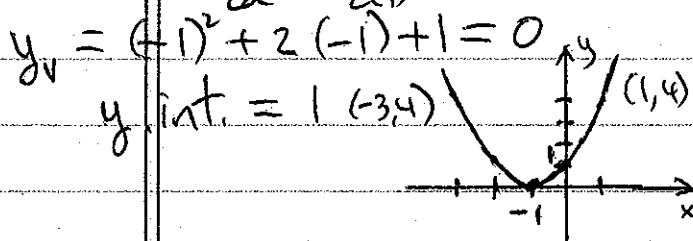
and $\lim_{x \rightarrow 1^+} f(x)$.

MAC 2233 EXAM I KEY - MWF (SP '10)

① a) $(x-1)^2 - 3(x-1) + 1$
 $= x^2 - 2x + 1 - 3x + 3 + 1$
 $= x^2 - 5x + 5$

b) $x+2 \neq 0 \Rightarrow x \neq -2$

② a) $y = x^2 + 2x + 1$ $\frac{x}{y}$
 $x = \frac{-b}{2a} = \frac{-2}{2(1)} = -1$ $\frac{1}{4}$



b) $2x - 3y = 7$
 $3x + 3y = 3$

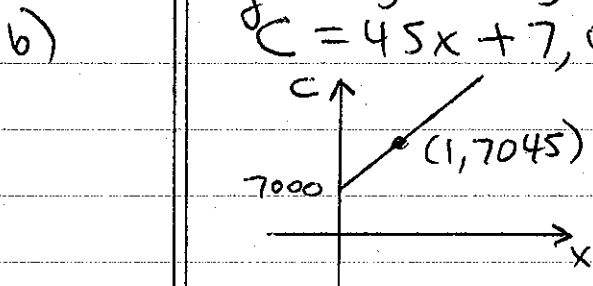
 $5x = 10$
 $x = 2$

$x + y = 1$
 $2 + y = 1 \Rightarrow y = -1$

Other methods are possible.

③ a) $m = \frac{3+5}{-2-1} = \frac{8}{-3}$
 $y - 3 = -\frac{8}{3}(x+2)$
 $y = -\frac{8}{3}x - \frac{16}{3} + \frac{9}{3}$

$y = -\frac{8}{3}x - \frac{7}{3}$
 $C = 45x + 7,000$



④ a) $\pi r^2 h = 24\pi$
 $h = \frac{24}{r}$
 $4\pi r^2 + 4\pi r^2 + 3(2\pi r h)$
 $= 8\pi r^2 + 6\pi r h$
 $= 8\pi r^2 + 6\pi r \left(\frac{24}{r}\right)$
 $= 8\pi r^2 + \frac{144\pi}{r}$

b) $xy = 216$ $S = x + y$
 $y = \frac{216}{x} \Rightarrow S = x + \frac{216}{x}$

⑤ a) $\lim_{x \rightarrow 4} \frac{\sqrt{x} - 2}{(\sqrt{x} + 2)(\sqrt{x} - 2)} = \frac{1}{2+2} = \frac{1}{4}$

b) $-\frac{2}{3}$

c) $\lim_{x \rightarrow 2} \frac{(x-2)(x^2+2x+4)}{(x-2)}$
 $= 2^2 + 2(2) + 4 = 12$

⑥ a) $\frac{1}{0^-} = -\infty$

b) $x^2 - x - 2 = 0$
 $(x-2)(x+1) = 0$
 $x = 2, -1$

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

$\lim_{x \rightarrow 1^+} f(x) = 3$