

(10) ① a) Find the domain of

$$y = f(x) = \frac{1}{\sqrt{x-3}}$$

b) What's the range of

$$y = g(x) = (x+2)^2 + 4$$

(15) ② a) Sketch $y = |x-1| + 2$
Include table of values
and y intercept.

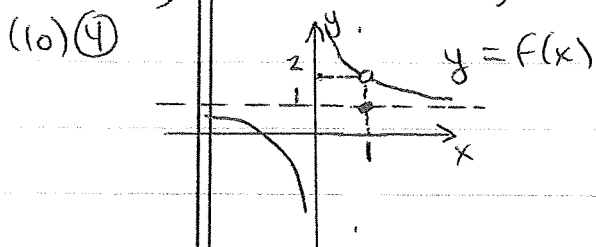
b) Is $f(x) = 4x^3 - 2x$ even,
odd, or neither. Explain
using functional notation.

c) Express $h(x) = |x^2 - 3|$ as
the composition of 2 functions
F and g with $h = f \circ g$.

Don't let $f(x) = x$ or $g(x) = x$.

(10) ③ a) If $f(x) = \sqrt[3]{3x+5} = y$, find
a formula for $f^{-1}(x)$.

b) Write $\tan(\sin^{-1} x)$ as an
algebraic expression without
trig. or inverse trig. functions.



a) Using the graph find
 $\lim_{x \rightarrow 0^+} f(x)$

b) Now find $\lim_{x \rightarrow 1} f(x)$

(15) ⑤ a) $\lim_{x \rightarrow 2^-} \frac{-3}{x-2}$

b) $\lim_{x \rightarrow 1} \frac{x^4 - 1}{x - 1}$

c) $\lim_{x \rightarrow 3^+} \frac{x-3}{|x-3|}$

(10) ⑥ a) $\lim_{x \rightarrow -\infty} \frac{2x+3}{9x^2-2}$

b) $\lim_{x \rightarrow \infty} (\sqrt{x^2+9} - x)$
Hint: Use conjugate.

(15) ⑦ a) Is $f(x) = \frac{x^2-9}{x-3}$
continuous everywhere?
If not, define $f(3)$ so it will
be.

b) Find the value of K to make

$$g(x) = \begin{cases} x+K & \text{if } x < 1 \\ 3x-1 & \text{if } x \geq 1 \end{cases}$$

continuous everywhere.

c) Approximate to within .05
the solution of

$$f(x) = x^3 - 3x + 1 = 0 \text{ that's} \\ \text{between 0 and 1.}$$

(15) ⑧ a) $\lim_{\theta \rightarrow 0} \frac{\tan 3\theta}{2\theta}$

b) Where is $f(x) = \csc x$ not
continuous?

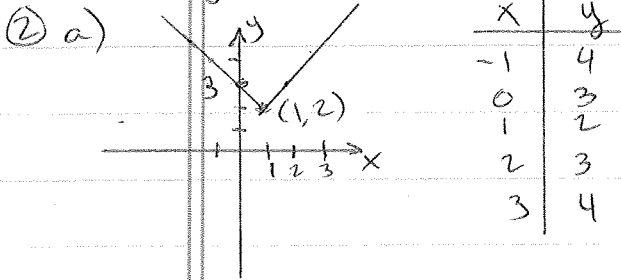
c) Where is $f(x) = \frac{1}{3 + \sin x}$
continuous?

Explain

MAC 2311 EXAMIA KEY (SP'11)

① a) $x - 3 > 0 \Rightarrow x > 3$
 (Can't divide by 0, here)

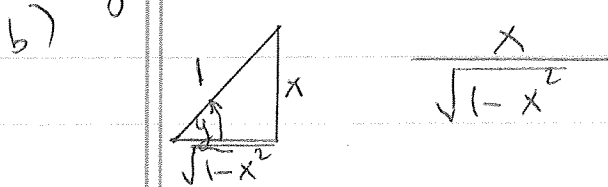
b) $y \geq 4$ (since $(x+2)^2 \geq 0$)



b) $f(-x) = 4(-x)^3 - 2(-x)$
 $= -4x^3 + 2x = -f(x)$
 f is odd.

c) $g(x) = x^2 - 3$, $f(x) = |x|$

③ a) $x = \sqrt[3]{3y+5}$
 $x^3 = 3y+5 \Rightarrow x^3 - 5 = 3y$
 $y = f^{-1}(x) = \frac{1}{3}(x^3 - 5)$



④ a) ∞

b) 2

⑤ a) $\frac{-3}{0^-}$ Ans. ∞

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

c) 1 since numerator = denom.
 when $x > 3$.

⑥ a) 0

b) $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2+9} - x}{\sqrt{x^2+9} + x}$

$= \lim_{x \rightarrow \infty} \frac{9}{\sqrt{x^2+9} + x} = 0$

since denominator $\rightarrow \infty$

⑦ a) $f(3) = \lim_{x \rightarrow 3} \frac{(x+3)(x-3)}{(x-3)}$

$= 3+3 = 6$

b) $1+K = 3(1) - 1$
 $1+K = 2 \Rightarrow K = 1$

c) $f(0) = 1$ $f(1) = -1$
 $f(.5) = -.375$ $f(.4) = -.136$
 $f(.3) = .127$

Take $x = .35$

⑧ a) $\lim_{\theta \rightarrow 0} \frac{\sin 3\theta}{\cos 3\theta (2\theta)}$

$= \frac{3}{2} \lim_{\theta \rightarrow 0} \frac{\sin 3\theta}{3\theta} \cdot \frac{1}{\cos 3\theta}$

$= \frac{3}{2} (1)(1) = \frac{3}{2}$

b) $\csc x = \frac{1}{\sin x}$
 $\sin x = 0$

$x = K\pi$ where K is
 any integer.

c) everywhere.

$3 + \sin x > 0$ since
 $\sin x \geq -1 > -3$.