MATH 1200 -EXAM 4A

SPRING 2014

NAME: Solution

Show ALL of your work for full credit. Simplify your answers as much as possibles. Each problem is worth 7points unless otherwise specified.

B6 **1.** Find the difference quotient $\dfrac{f(x+h)-f(x)}{h}$ if $f(x)=2x+4$.

$f(x)=2x+4$

$f(x+h)=2(x+h)+4$

$f(x+h)-f(x)=\cancel{2x}+2h+\cancel{4}-\cancel{2x}-\cancel{4}$

$=2h$

$\dfrac{f(x+h)-f(x)}{h}=\dfrac{2h}{h}$

$=2$

B3 **2.** Given $f(x)=x^2+2$ and $g(x)=x+1$ where $g(x)\neq 0$, find the following functions and determine its domain.

A. $(f+g)(x)$

$(f+g)(x)$

$=f(x)+g(x)$

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

$=x^2+x+3$

Domain: $(-\infty,\infty)$

B. $\left(\dfrac{f}{g}\right)(x)=\dfrac{f(x)}{g(x)}$

$=\dfrac{x^2+2}{x+1}$ $\quad x+1\neq 0$, $x\neq -1$

Domain $(-\infty,-1)\cup(-1,\infty)$

B4 **3.** Given $f(x)=-3x+1$ and $g(x)=\dfrac{1}{x}$, find the function $(f\circ g)(x)$ and write the domain of $(f\circ g)(x)$ using set-builder notation.

$(f\circ g)(x)=f(g(x))$

$=f\left(\frac{1}{x}\right)$

$=-3\left(\frac{1}{x}\right)+1$ $\quad x\neq 0$

$=\dfrac{-3+x}{x}$

Domain $(-\infty,0)\cup(0,\infty)$

B5 **4.** Given $h(x)=\sqrt[3]{2x+1}$, find two function f and g, such that $h(x)=(f\circ g)(x)$.

$g(x)=2x+1$

$f(x)=\sqrt[3]{x}$

B1 **5.** Write $f(x) = 2x^2 - 4x - 3$ in vertex form using any method. Also identify the vertex and axis of symmetry.

$f(x) = 2x^2 - 4x - 3$
$= 2(x^2 - 2x) - 3$
$= 2[x^2 - 2x + 1 - 1] - 3$
$= 2(x-1)^2 - 2 - 3$
$= 2(x-1)^2 - 5$

vertex $(1, -5)$
axis: $x - 1 = 0$
$x = 1$

B2 **6.** Given $f(x) = x^4 + 8x^3 + 12x^2$,

A. Determine the end behavior of $f(x)$[5pt]

Since the degree of $f(x)$ is even, and leading co-efficient is positive
both ends go up $\cup$

B. Find the zeros of $f(x)$ and state the multiplicities of each zero.

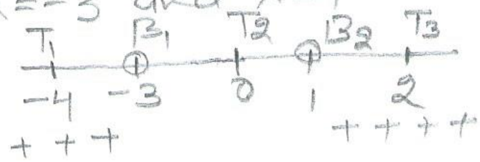
$f(x) = 0$
$x^4 + 8x^3 + 12x^2 = 0$
$x^2(x^2 + 8x + 12) = 0$
$x^2(x+6)(x+2) = 0$
$x = 0$; $x = -6$; $x = -2$
Multiplicity: 2 ; 1 ; 1

38 **7.** Given $f(x) = x^4 - 8x^3 + 3x^2 + 5x - 82$, evaluate $f(-2)$ using the Remainder Theorem, and determine if $(x+2)$ is a factor of $f(x)$.

$f(-2) = (-2)^4 - 8(-2)^3 + 3(-2)^2 + 5(-2) - 82$
$= 16 - 8(-8) + 3(4) - 12 - 82$
$= (16 + 64 + 12) - 12 - 82$
$= 92 - 92$
$= 0$
Since $f(-2) = 0$, So $(x+2)$ is a factor of $f(x)$.

B9 **8.** Solve the inequality $2x^2 - 3 > x^2 - 2x$, and write your answer using interval notation.

$2x^2 - 3 - x^2 + 2x > 0$
$x^2 + 2x - 3 > 0$
$(x+3)(x-1) > 0$
Boundary values $x = -3$ and $x = 1$
Test values: $-4, 0, 2$



$(-\infty, -3) \cup (1, \infty)$

B7 **9.** A coin is dropped from the top of Morton Hall. Its height above the ground in feet is given by $h(t) = 100 - 16t^2$ at t seconds after it is dropped.

A. From what height is the coin dropped? at $t=0$

$h(0) = 100 - 16(0)$

$h(0) = 100$ feet

B. At what time does the coin reach the ground?

Coin reaches ground when $h=0$

$0 = 100 - 16t^2$

$16t^2 = 100$

$t^2 = \frac{100}{16}$

$t = \frac{10}{4} = \frac{5}{2}$ secs.

B10 **10.** Given $f(x) = \dfrac{x-2}{(2x+3)(x+4)}$,

A. Find the domain of $f(x)$[3pt].

Since $2x+3 \neq 0$ and $x+4 \neq 0$

$x \neq -\frac{3}{2}$ and $x \neq -4$

So domain of $f(x)$ is

$(-\infty, -\frac{3}{2}) \cup (-\frac{3}{2}, -4) \cup (-4, \infty)$

B. Find the x-intercept[3pt]

x-intercept; $y=0$

$\frac{x-2}{(2x+3)(x+4)} = 0$ only if

numerator is zero

$x - 2 = 0$

$x = 2$

C. Find the y-intercept[3pt]

y-intercept; $x=0$

$f(x) = \frac{-2}{(0+3)(0+4)}$

$= -\frac{2}{12}$

$= -\frac{1}{6}$

$(0, -\frac{1}{6})$

D. Find the Vertical asymptote[3pt]

Denominator $= 0$

$2x+3=0$ and $x+4=0$

$x = -\frac{3}{2}$ and $x = -4$

Vertical Asymptotes are

$x = -\frac{3}{2}$ and $x = -4$

E. Find the Horizontal asymptote[3pt]

$f(x)$ behaves like

$\frac{x}{2x^2} = \frac{1}{2x}$

as x approaches to

a very large or

very small value

$f(x)$ approaches 0

$y=0$ is H. Asymptote

F. Sketch the graph of $f(x)$[3pt]