MAT 1140 EXAM 3 B NAME _____

SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER.

TURN IN ALL WORKSHEETS. CALCULATORS ARE REQUIRED ON THIS TEST.

1a) $(-2+i)^3$

b) $-5i(4-3i)^2$

2. Express $\frac{3-4i}{2-5i}$ in $a+bi$ form where a & b are fractions. Explain what you did.

3. If $y = -(x+4)^2 + 3$

a) Vertex: _____

b) Domain: _____

c) Range: _____

d) Interval increasing: _____
decreasing: _____

4. $y = 2x^2 - 8x - 10$

a) Determine vertex by completing square

b) Determine vertex graphically.

5a) Give solutions for $2x^2 - 8x - 10 = 0$

b) Give intervals for $2x^2 - 8x - 10 < 0$

c) Give intervals for $2x^2 - 8x - 10 \geq 0$

6. Solve analytically, give exact values for endpoints:

a) $-x^2 - 5x + 2 > 0$

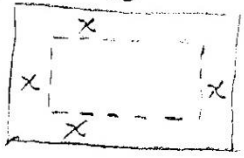
b) $-x^2 - 5x + 2 \leq 0$

7. $P(x) = -1.87x^2 + 5.4x + 6.23$

a) Find x intercepts (what calculator

b) Find the vertex functions were used?)

8. A piece of cardboard 10 cm by 16 cm. has a small square cut from each corner, with edges folded up to make a box. What size square should be cut to make the volume of the box maximum? Find the maximum volume. Give formula for volume in terms of x, describe calculator method, sketch the graph.



9a) Express $P(x) = 2x^3 - 3x^2 - 5x + 6$ with linear factors

b) Solve $P(x) = 0$ c) $P(x) > 0$ d) $P(x) < 0$

10. There is only one real root of $\sqrt{10}\,x^3 - \sqrt{11}\,x - \sqrt{2} = 0$. Use the calculator to find it, (round to nearest hundredth).

8

11. Find the <u>three</u> roots of $x^3 = 64$ (not all are real!)

12. Solve $\sqrt{1+5x} = 2x-2$

a) analytically b) graphically.

13. Use #12 to solve

a) $\sqrt{1+5x} > 2x-2$ b) $\sqrt{1+5x} < 2x-2$

14a) Find the inverse $f^{-1}(x)$ for $f(x) = \sqrt[3]{x-5}$.

b) Sketch $f(x)$ and $f^{-1}(x)$ on the same graph.

15. Find the inverse $f^{-1}(x)$ for $f(x) = \frac{2x+3}{x-1}$

MAC 1140 Exam 3 Solutions

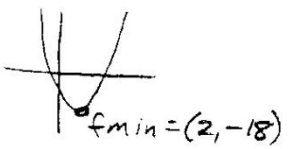
1a) $(-2+i)\wedge 3 = -2+11i$

b) $-5i(4-3i)^2 = -120-35i$

2. $(3-4i)\div(2-5i) =$ (Gives decimals)
Custom, Frac, Enter
$(26/29, 7/29)$
(or use conjugate $2+5i$)

3. $y = -(x+4)^2+3$
a) $V(-4,3)$ Opens down.
b) Domain: $(-\infty,\infty)$
c) Range: $(-\infty, 3]$
d) Increasing $(-\infty,-4)$
Decreasing $(-4,\infty)$

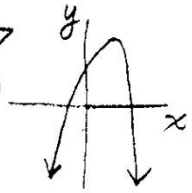
4a) $y = 2x^2-8x-10$
$y\_\_ = 2(x^2-4x\ \ )-10$
$y+8 = 2(x^2-4x+4)-10$
$+10 \qquad +10$
$y+18 = 2(x-2)^2$
$V(2,-18)$

b)


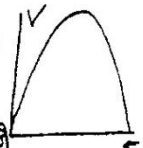
5a) $2x^2-8x-10=0$
Root $x=-1, 5$
b) $(-1,5)$
c) $(-\infty,-1]\cup[5,\infty)$

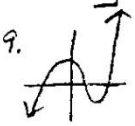
6. $-x^2-5x+2>0$
$x^2+5x-2<0$
$x = \frac{-5\pm\sqrt{25-4(-2)}}{2}$
a) $\left(\frac{-5-\sqrt{33}}{2}, \frac{-5+\sqrt{33}}{2}\right)$
b) $x^2+5x-2\geq 0$
$\left(-\infty, \frac{-5-\sqrt{33}}{2}\right]\cup\left[\frac{-5+\sqrt{33}}{2}, \infty\right)$

7. $P(x) = -1.87x^2+5.4x+6.23$
a) Root; $x=-.88, 3.77$
b) FMAX: $(1.44, 10.13)$



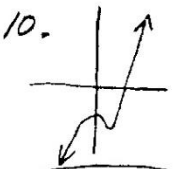
8. $V = LWH$
$V = x(16-2x)(10-2x)$
RANGE $x=0$ to 5
ZOOM FIT, FMAX
$x=2$, $V=144\ cm^3$



9.

Root $= 1, 2, -1\frac{1}{2}$

a) $P(x) = (x-1)(x-2)(2x+3)$
b) $x = 1, 2, -1.5$
c) $P(x)\geq 0$
$(-3/2, 1)\cup(2,\infty)$
d) $P(x)<0$
$(-\infty,-3/2)\cup(1,2)$

9a) also correct
$P(x) = \frac{1}{2}(x-1)(x-2)(x+1.5)$

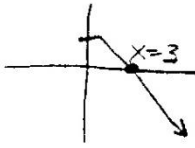
10.

Root 1.31

11. $x^3-64=0$
$(x-4)(x^2+4x+16)=0$
$x=4$
$x^2+4x+4 = -16+4$
$(x+2)^2 = -12$
$x = -2\pm 2i\sqrt{3}$

12a) $\sqrt{1+5x} = 2x-2$
$1+5x = (2x-2)^2$
$1+5x = 4x^2-8x+4$
$0 = 4x^2-13x+3$
$(4x-1)(x-3)$
$x=1/4$ $\quad x=3$

$1+5x\geq 0$
$5x\geq -1$
$x\geq -1/5$

Ch: $\sqrt{1+5/4} = \frac{1}{2}-2$ No!
$\sqrt{16} = 6-2$ Yes!

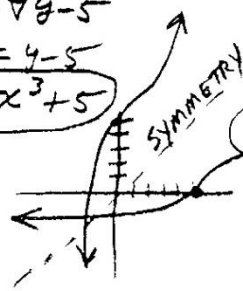
c)


$y = \sqrt{1+5x} = 2x-2$
Root $= 3$

13a) $\sqrt{1+5x} > 2x-2$
$1+5x\geq 0$
$5x\geq -1$
$[-1/5, 3)$

c) $\sqrt{1+5x} < 2x-2$
$(3,\infty)$

14. $f(x) = \sqrt[3]{x-5}$
$y = \sqrt[3]{x-5}$
Interchange x, y:
$x = \sqrt[3]{y-5}$
$x^3 = y-5$
$f^{-1}(x) = y = x^3+5$



15. $y = \frac{2x+3}{x-1}$
$x = \frac{2y+3}{y-1}$
$xy-x = 2y+3$
$xy-2y = x+3$
$y(x-2) = x+3$
$f^{-1}(x) = \frac{x+3}{x-2}$