MATH 150, FALL 2014
EXAM I MULTIPLE CHOICE - VERSION C

LAST NAME(print): _____ FIRST NAME(print): _____

UIN: _____ SECTION NUMBER: _____

DIRECTIONS:

1. This is a 9-question multiple-choice exam; there is no partial credit. Each problem is worth 5 points for a total of 45 points. Mark the correct choice on your ScanTron using a No. 2 pencil. The scantrons will not be returned, therefore *for your own records, also record your choices on your exam!*
2. The use of a calculator and computer is prohibited.
3. TURN OFF cell phones and put them away. If a cell phone is seen during the exam, your exam will be collected and you will receive a zero.
4. Be sure to *write your name, section number and version letter of the exam on the ScanTron form.*
5. Your exam grade (sum of both exam parts) will be posted in WebAssign.
6. You may not discuss the contents of the exam with anyone until the exam is returned in class.

THE AGGIE CODE OF HONOR

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Signature: _____

1. Find the **SUM** of the solutions. If there is only one answer, give it.

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

(a) 1
(b) 4
(c) 5
(d) 10
(e) None of these

$\sqrt{5-x} = x-3$

$5-x = x^2-6x+9$

$x^2-5x+4=0 \Rightarrow (x-1)(x-4)=0$

$A=-5$: -1 -4

$M=4$

$x=1$ | $x=4$

check $(x=1)$ $\sqrt{5-1}+1=1-2$

$\sqrt{4}+1=-1$ ✗

$x=1$ not a solution,

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

$\sqrt{1}+1=2$

$2=2$ ✓

$\therefore x=4$ is a solution.

$\therefore$ Sum of solutions is 4.

2. Simplify $\dfrac{\left(\frac{1}{2}\right)^{-22}-8^7}{4^{12}+4^{11}}$

(a) $-\frac{1}{4}$
(b) $\frac{1}{4}$
(c) $\frac{1}{10}$
(d) $\frac{1}{16}$
(e) None of these

$= \dfrac{2^{22}-(2^3)^7}{(2^2)^{12}+(2^2)^{11}} = \dfrac{2^{22}-2^{21}}{2^{24}+2^{22}}$

$= \dfrac{2^{21}(2^1-1)}{2^{22}(2^2+1)} = \dfrac{2-1}{2(2^2+1)}$

$= \dfrac{1}{2\cdot 5} = \dfrac{1}{10}$.

3. Fully factor $x^4 - 2x^3 + 8x - 16$

(a) $(x^2 - 4)(x^2 + 2x + 4)$
(b) $(x + 2)(x - 2)(x^2 + 2x + 4)$
(c) $(x + 2)(x - 2)(x + 1)(x + 4)$
(d) $(x + 2)^2(x - 2)^2$
✓ (e) $(x - 2)(x + 2)(x^2 - 2x + 4)$

$$x^4 - 2x^3 + 8x - 16$$
$$= x^3(x-2) + 8(x-2)$$
$$= (x^3+8)(x-2)$$
$$= (x^3+2^3)(x-2)$$
$$= (x+2)(x^2-2x+4)(x-2)$$

4. Solve the equation $x^{\frac{2}{3}} - 6x^{\frac{1}{3}} - 16 = 0$ for x

(a) $x = 2$ or $x = \sqrt[3]{-2}$
(b) $x = 2$ or $x = -\sqrt[3]{2}$
(c) $x = -2$ or $x = 8$
✓ (d) $x = -8$ or $x = 512$
(e) None of these

Let $u = x^{\frac{1}{3}}$, $u^2 = x^{\frac{2}{3}}$

$$\Rightarrow u^2 - 6u - 16 = 0$$
$A = -6$: $2, -8$
$M = -16$

$$\Rightarrow (u+2)(u-8) = 0$$
$u = -2$ | $u = 8$

$$\therefore x^{\frac{1}{3}} = -2 \text{ or } 8$$
$$x = -8 \text{ or } 512$$

5. Fully simplify $\dfrac{\frac{x+h}{x+h+1}-\frac{x}{x+1}}{h}$

(a) $\frac{1}{(x+h+1)(x+1)}$

(b) $\frac{x+h}{(x+h+1)(x+1)}$

(c) $\frac{x}{(x+h+1)(x+1)}$

(d) $\frac{x(h-1)}{(x+h+1)(x+1)}$

(e) None of these

$$= \frac{\frac{(x+h)}{(x+h+1)}\cdot\frac{(x+1)}{(x+1)} - \frac{x}{(x+1)}\cdot\frac{(x+h+1)}{(x+h+1)}}{h}$$

$$= \frac{\frac{x^2+x+hx+h}{(x+h+1)(x+1)} - \frac{x^2+xh+x}{(x+h+1)(x+1)}}{h}$$

$$= \frac{\frac{x^2+x+hx+h-x^2-xh-x}{(x+h+1)(x+1)}}{h} = \frac{\frac{h}{(x+h+1)(x+1)}}{\frac{h}{1}}$$

$$= \frac{h}{h(x+h+1)(x+1)} = \frac{1}{(x+h+1)(x+1)}$$

6. Fully simplify $\sqrt[3]{24x^{22}} - \sqrt[3]{81x^{23}} + 5x^7 \cdot \sqrt[3]{3x}$

(a) $4x^7\sqrt[3]{3x}$

(b) $4x^{-1}\sqrt[3]{3x}$

(c) $7x^7\sqrt[3]{3x} - 3x^7\sqrt[3]{3x^2}$

(d) $7x^7\sqrt[3]{3x} - 3x^8\sqrt[3]{3x}$

(e) None of these

$$= \sqrt[3]{2^3\cdot 3\cdot x^{21}\cdot x^1} - \sqrt[3]{3^3\cdot 3^1\cdot x^{21}\cdot x^2} + 5x^7\cdot\sqrt[3]{3x}$$

$$= 2\cdot x^7\cdot\sqrt[3]{3x} - 3\cdot x^7\cdot\sqrt[3]{3x^2} + 5\cdot x^7\cdot\sqrt[3]{3x}$$

$$= 7\cdot x^7\cdot\sqrt[3]{3x} - 3\cdot x^7\sqrt[3]{3x^2}$$

7. Fully simplify $-2^2\cdot\left(\left(9\sqrt{7}-1\right)^4\right)^0 - 14\div 7\cdot 2 - 6\cdot(2-4)^3 + 2\left|\sqrt{3}-2\right|$

(a) $44-2\sqrt{3}$

(b) $44+2\sqrt{3}$

(c) $47-2\sqrt{3}$

(d) $52-2\sqrt{3}$

(e) $52+2\sqrt{3}$

$\left(\left(9\sqrt{7}-1\right)^4\right)^0 = 1$

$$= -4 - 14\div 7\cdot 2 - 6\cdot(-2)^3 - 2\left(\sqrt{3}-2\right)$$

$$= -4 - 2\cdot 2 - 6\cdot(-8) - 2\left(\sqrt{3}-2\right)$$

$$= -4-4+48-2\sqrt{3}+4$$

$$= 44-2\sqrt{3}$$

8. Fully simplify $\sqrt{x\sqrt{x\sqrt[3]{\frac{1}{x^2}}}}$ and rewrite in fractional exponent form.

(a) $x^{-\frac{1}{6}}$
(b) $x^{\frac{1}{6}}$
(c) $x^{\frac{7}{12}}$
(d) $x^{-\frac{7}{12}}$
(e) None of these

$\sqrt{x\cdot\sqrt{x\cdot\sqrt[3]{\frac{1}{x^2}}}}$

$= x^{-\frac{2}{3}}$

$x\cdot x^{-\frac{2}{3}} = x^{1-\frac{2}{3}} = x^{\frac{1}{3}}$

$= \left(x^{\frac{1}{3}}\right)^{\frac{1}{2}} = x^{\frac{1}{6}}$

$x\cdot x^{\frac{1}{6}} = x^{1+\frac{1}{6}} = x^{\frac{7}{6}}$

$= \left(x^{\frac{7}{6}}\right)^{\frac{1}{2}} = x^{\frac{7}{12}}$

9. Find the **sum** of the solutions. If there is only one answer, give it.

(a) -2
(b) -1
(c) 2
(d) 3
(e) None of these

$|x^2 - x - 4| = 2$

$x^2 - x - 4 = 2$

$x^2 - x - 6 = 0$

$A = 1$, $M = -6$: $2 \to 3$

$(x+2)(x-3) = 0$

$x = -2 \mid x = 3$

$x^2 - x - 4 = -2$

$x - x - 2 = 0$

$A = -1$, $M = -2$: $1 \to 2$

$(x+1)(x-2) = 0$

$x = -1 \mid x = 2$

Check. and

$\therefore x = -2$ or 3 or -1 or 2

Sum of solutions $= -2 + 3 - 1 + 2 = 2$

MATH 150, FALL 2014
EXAM I WORK OUT - VERSION A

LAST NAME(print): _____ FIRST NAME(print): _____

UIN: _____ SECTION NUMBER: _____

DIRECTIONS:

1. This is a 9-question work-out exam; Each problem is worth 5 points (or 10 points) for a total of 55 points. Write all solutions in the space provided as full credit will not be given without complete, correct accompanying work, even if the final answer is correct.
2. Fully simplify all your answers, and give exact answers unless otherwise stated.
3. Circle your final answer.
4. The use of a calculator and computer is prohibited.
5. TURN OFF cell phones and put them away. If a cell phone is seen during the exam, your exam will be collected and you will receive a zero.
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1. Solve for the variable r in the equation,

$$F = G\frac{mM}{r^2} \qquad r > 0$$

$$r^2 F = GmM$$

$$r^2 = \frac{GmM}{F}$$

$$r = \sqrt{\frac{GmM}{F}}$$

2. Solve the equation $x^2 - 8x + 13 = 0$ by Completing the Square

$$x^2 - 8x = -13$$

$$x^2 - 8x + (-4)^2 = -13 + (-4)^2$$

$$(x-4)^2 = -13 + 16$$

$$(x-4)^2 = 3$$

$$x - 4 = \pm\sqrt{3}$$

$$\therefore x = 4 \pm \sqrt{3}$$

$z \geq 0$

3. In the real numbers, fully simplify $\sqrt[4]{48x^8y^{12}z^{13}}$. For the final answer, use the radical form if needed.

$$= \sqrt[4]{2^4 \cdot 3 \cdot x^8 \cdot y^{12} \cdot z^{12} \cdot z^1}$$

$$= 2x^2 \cdot |y|^3 \cdot z^3 \cdot \sqrt[4]{3z}.$$

4. Factor $4x^4 + 2x^3 - 30x^2$ as completely as possible

$= 2x^2(2x^2 + x - 15)$

$A = 1$
$M = -30 : -5 \quad 6$

$= 2x^2(2x^2 - 5x + 6x - 15)$
$= 2x^2(x(2x-5) + 3(2x-5))$
$= 2x^2(2x-5)(x+3)$

5. Fully simplify $\sqrt[3]{\frac{27\sqrt{y^4}}{4y^3}}$, and if needed use radical form in the answer.

$= \sqrt[3]{\frac{3^3 \cdot y^2}{4y^3}} = \sqrt[3]{\frac{3^3}{4y}} = \frac{\sqrt[3]{3^3}}{\sqrt[3]{4y}}$

$= \frac{3}{\sqrt[3]{2^2 \cdot y}} \cdot 1 = \frac{3}{\sqrt[3]{2^2 y}} \cdot \frac{\sqrt[3]{2 \cdot y^2}}{\sqrt[3]{2 \cdot y^2}} = \frac{3 \cdot \sqrt[3]{2y^2}}{\sqrt[3]{2^3 y^3}}$

$= \frac{3 \cdot \sqrt[3]{2y^2}}{2y}$

6. Evaluate $\left|\frac{\overline{-1-3i}}{1-2i}\right|$

$= \left|\frac{-1+3i}{1-2i}\right| = \left|\frac{-1+3i}{1-2i}\cdot\frac{1+2i}{1+2i}\right| = \left|\frac{-1+i-6}{1+4}\right| = \left|\frac{-7+i}{5}\right|$

$= \frac{|-7+i|}{5} = \frac{\sqrt{49+1}}{5} = \frac{\sqrt{50}}{5} = \frac{5\sqrt{2}}{5} = \sqrt{2}$

or $= \left|\frac{-1+3i}{1-2i}\right| = \frac{|-1+3i|}{|1-2i|} = \frac{\sqrt{(-1)^2+3^2}}{\sqrt{1^2+(-2)^2}} = \frac{\sqrt{10}}{\sqrt{5}} = \sqrt{2}$.

7. (10 points) Fully simplify

$$\frac{\frac{1}{y}-\frac{2}{2y+1}}{\frac{6}{y}+7} = \frac{\frac{1}{y}\cdot\frac{(2y+1)}{(2y+1)}-\frac{2}{(2y+1)}\cdot\frac{y}{y}}{\frac{6}{y}+\frac{7}{1}\cdot\frac{y}{y}}$$

State all the restrictions on y.

$$= \frac{\frac{2y+1}{y(2y+1)}-\frac{2y}{y(2y+1)}}{\frac{6}{y}+\frac{7y}{y}} = \frac{\frac{2y+1-2y}{y(2y+1)}}{\frac{6+7y}{y}} = \frac{\frac{1}{y(2y+1)}}{\frac{6+7y}{y}}$$

: restriction $y \neq 0, -\frac{1}{2}, -\frac{6}{7}$.

$$= \frac{y}{y(2y+1)(6+7y)} = \frac{1}{(2y+1)(6+7y)}$$

8. Fully simplify $\frac{8}{\sqrt[3]{2}(3-\sqrt{5})}$ and rationalized the denominator. In the answer, use the radical form if needed.

$$= \frac{8}{\sqrt[3]{2}(3-\sqrt{5})}\cdot\frac{\sqrt[3]{2^2}\cdot(3+\sqrt{5})}{\sqrt[3]{2^2}\cdot(3+\sqrt{5})} = \frac{8\cdot\sqrt[3]{4}\cdot(3+\sqrt{5})}{\sqrt[3]{2^3}\cdot(9-5)}$$

$$= \frac{8\cdot\sqrt[3]{4}\cdot(3+\sqrt{5})}{2\cdot 4} = \frac{8\cdot\sqrt[3]{4}\cdot(3+\sqrt{5})}{8} = \sqrt[3]{4}\cdot(3+\sqrt{5}).$$

9. (10 points) Divide $3x^4 - 5x^3 - 25x - 3$ by $x^2 + x + 3$, identify the remainder.

$$
\begin{array}{r}
3x^2 - 8x - 1 \\
x^2+x+3 \;\overline{)\; 3x^4 - 5x^3 + 0\cdot x^2 - 25x - 3} \\
\underline{3x^4 + 3x^3 + 9x^2} \\
-8x^3 - 9x^2 - 25x \\
\underline{-8x^3 - 8x^2 - 24x} \\
-x^2 - x - 3 \\
\underline{-x^2 - x - 3} \\
0
\end{array}
$$

Question	Points Awarded	Question	Points Awarded
Multiple Choice 1-9			
Work out 1		6	
2		7	
3		8	
4		9	
5			
		Total	