High 98%
mean 79.1%
median 82%

F2017
High 100%
mean 78.2%
median 82.5%

8:10
8:12

Test 3
Dusty Wilson
Math 098

Name: key

And what are these fluxions? The velocities of evanescent increments? They are neither finite quantities, nor quantities infinitely small, nor yet nothing. May we not call them ghosts of departed quantities?

George Berkeley (1685 - 1753)
Irish Philosopher

No work = no credit
No Symbolic Calculators

100	90's	80's	70's	60's	< 60
2	6	7	7	2	4

Warm-ups (1 pt each): $i^2 =$ -1 $\quad i^0 =$ 1 $\quad -i^2 =$ 1

1.) (1 pt) According to Berkeley (see above), how much confidence should we place in fluxions?

Not much... they're just ghosts.

2.) (2 pts) Simplify $a^{\frac{10}{3}} \cdot a^{\frac{1}{6}}$ completely

$\frac{1.5}{2}$ for $a^{21/6}$

$\frac{20}{6} + \frac{1}{6} = \frac{21}{6} = \frac{7}{2}$

Result: $a^{7/2}$

3.) (2 pts) Rewrite $\sqrt[3]{y^7}$ with rational exponents

Result: $y^{7/3}$

4.) (2 pts) Simplify $\sqrt[3]{\frac{48x^{18}}{y^{21}}}$ completely

$48 = 2^4 \cdot 3$

Result: $\frac{2x^6\sqrt[3]{6}}{y^7}$

5.) (2 pts) Simplify $\sqrt{5x^7}\sqrt{10x^6}$

$= \sqrt{50x^{13}}$

Result: $5x^6\sqrt{2x}$

6.) (2 pts) Rewrite $\frac{7^{-\frac{5}{3}}x^4y^{-\frac{3}{4}}}{z^{-3}}$ using only positive, rational exponents

Result: $\frac{x^4 z^3}{7^{5/3}\, y^{3/4}}$

7.) (2 pts) Multiply and simplify $\left(3\sqrt{5}+\sqrt{7}\right)\left(\sqrt{5}-4\sqrt{7}\right)$

$= 15 - 12\sqrt{35} + \sqrt{35} - 28$

Result: $-13 - 11\sqrt{35}$

8.) (2 pts) Simplify $\sqrt{108x^3y^6}$ completely

$108 = 36 \cdot 3$

Result: $6xy^3\sqrt{3x}$

9.) (2 pts) Simplify $6\sqrt[3]{135}+\sqrt[3]{40}$ completely

$135 = 5 \cdot 27$

$40 = 5 \cdot 8$

$18\sqrt[3]{5} + 2\sqrt[3]{5}$

Result: $20\sqrt[3]{5}$

10.) (2 pts) Simplify $\frac{\sqrt{21xy^3}}{\sqrt{3x}}$ completely

$= \sqrt{\frac{21xy^3}{3x}}$

$= \sqrt{7y^3}$

Result: $y\sqrt{7y}$

11.) (2 pts) Rationalize the denominator: $\frac{11x}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

Result: $\frac{11x\sqrt{3}}{3}$

12.) (2 pts) Rationalize the denominator: $\frac{1}{2+\sqrt{3}} \cdot \frac{2-\sqrt{3}}{2-\sqrt{3}}$

$$= \frac{2-\sqrt{3}}{4-3}$$

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

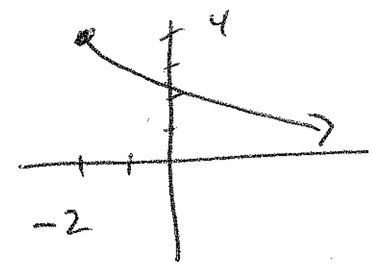
Result: $2-\sqrt{3}$

13.) (4 pts) Determine algebraically the domain of the function $f(x)=4-\sqrt{x+2}$. Then use the graph to find the range. Sketch the graph in the box to justify your range.

$x+2 \geq 0$

$x \geq -2$

Graph



Domain: $[-2,\infty)$

Range: $(-\infty,4]$

14.) (2 pts) Simplify $(2+3i)-(4+5i)$. Write your answer in standard form.

$= 2+3i-4-5i$

Result: $-2-2i$

15.) (2 pts) Simplify $(2+3i)(4+5i)$. Write your answer in standard form.

$= 8 + 10i + 12i + \underbrace{15i^2}_{-1\cdot 15}$

Result: $-7+22i$

16.) (2 pts) Simplify $\frac{2+3i}{4+5i}$. Write your answer in standard form.

$$\frac{2+3i}{4+5i} \cdot \frac{4-5i}{4-5i} = \frac{8-10i+12i-15i^2}{16-25i^2}$$

$$= \frac{23+2i}{41}$$

Result: $\frac{23}{41} + \frac{2}{41}i$

17.) (5 pts) Solve $\sqrt{y+4}+6=7$

$\Rightarrow (\sqrt{y+4})^2 = (1)^2$

$\Rightarrow y+4=1$

$\Rightarrow y=-3$

check ✓

Result: $y=-3$

18.) (5 pts) Solve $x=\sqrt{x-1}+3$

$\Rightarrow (x-3)^2 = (\sqrt{x-1})^2$

$\Rightarrow x^2-6x+9 = x-1$

$\Rightarrow x^2-7x+10=0$

$\Rightarrow (x-5)(x-2)=0$

$\Rightarrow x=5$ or $\cancel{x=2}$

Result: $x=5$

19.) (4 pts) Solve $(\sqrt{6x+7})^2=(1+\sqrt{3x+3})^2$

$\Rightarrow 6x+7 = 1+2\sqrt{3x+3}+3x+3$

$\Rightarrow (3x+3) = (2\sqrt{3x+3})^2$

$\Rightarrow 9x^2+18x+9 = 4(3x+3)$

$= 12x+12$

$\Rightarrow \dfrac{9x^2+6x-3}{3} = \dfrac{0}{3}$

$\Rightarrow 3x^2+2x-1=0$ — 3pts.

Result: $x=\frac{1}{3}$ or $x=-1$

$\Rightarrow (3x-1)(x+1)=0$

$\Rightarrow x=\frac{1}{3}$ or $x=-1$

check ✓