

NC Final Review: Round 1

1. $3(x-10) - 12 = 24$

$$3x - 30 - 12 = 24$$

$$3x - 42 = 24$$

$$3x = 66$$

$$x = 22$$

(C)

2. $x^2 - 5x - 36 = 0$

$$(x-9)(x+4) = 0$$

$$x = 9 \quad x = -4$$

$$(9)(-4) = -36$$

(B)

3. $x = \text{dimes}$

$$y = \text{quarters}$$

$$(x + y = 15) \cdot 10$$

$$10x + 25y = 210$$

$$\rightarrow -10x - 10y = -150$$

$$15y = 60$$

$$y = 4$$

$$x + 4 = 15 \quad x = 11$$

(D)

4.

Mix A

40

Amt

$200 - x$

Mix B

60

x

Total

54

200

$$40(200 - x) + 60x = 54(200)$$

$$8000 - 40x + 60x = 10800$$

$$8000 + 20x = 10800$$

$$20x = 2800$$

$$x = 140$$

(C)

5. $2(10 - x) - 14 \leq 30$

$$20 - 2x - 14 \leq 30$$

$$-2x + 6 \leq 30$$

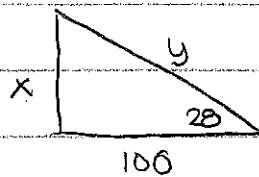
$$-2x \leq 24$$

$$x \geq -12$$

$[-12, \infty)$

(A)

6.



$$\tan 28 = \frac{x}{100}$$

$$x = 53.17$$

$$\cos 28 = \frac{100}{y}$$

$$y = \frac{100}{\cos 28} = 113.25$$

$$\text{tree} = 53.17 + 113.25$$

$$= 166.4 \text{ ft}$$

$$7. y = -16x^2 + 300x + 40$$

$$x = \frac{-300}{2(-16)} = \frac{-300}{-32} = 9.375$$

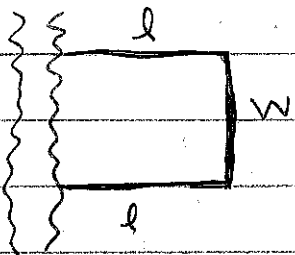
$$y = -16(9.375)^2 + 300(9.375) + 40$$

$$y = 1446.25$$

(D)

$$8. \quad 2L + W = 3000$$

$$A = LW$$



$$W = 3000 - 2L$$

$$A = L(3000 - 2L)$$

$$A = 3000L - 2L^2$$

$$2(750) + W = 3000$$

$$A = -2L^2 + 3000L$$

$$1500 + W = 3000$$

$$x = \frac{-3000}{2(-2)} = \frac{-3000}{-4} = 750$$

$$W = 1500$$

$$2(-2) \quad 4$$

(A)

NC Final Quiz Bowl: Round 2

1. $(3x-1)(x^2-3x+4)$

$$\begin{array}{r} x^2 - 3x + 4 \\ 3x \overline{) 3x^3 - 9x^2 + 12x} \\ \underline{-1x^2 + 3x} \\ -1x^2 + 3x - 4 \\ \underline{0x^2 + 0x - 4} \\ -4 \end{array}$$

$3x^3 - 10x^2 + 15x - 4$

(D)

5. $y = a(1+r)^t$

$600 = 200(1+0.04)^t$

$3 = (1+0.04)^t$

$y_1 = 3$

$y_2 = (1+0.04)^t$ } intersect

$x = 28 \text{ years}$ (B)

2. $x = -\frac{4}{5}$ $x = \frac{5}{7}$

$5x = -4$ $7x = 5$

$5x + 4 = 0$ $7x - 5 = 0$

$(5x+4)(7x-5) = 0$

$35x^2 - 25x + 28x - 20 = 0$

$35x^2 + 3x - 20 = 0$

(A)

6. $y = a(1+r)^t$

$164 = 10(1+r)^5$

$16.4 = (1+r)^5$

$y_1 = 16.4$ $y_2 = (1+r)^5$

$x = 0.75$ or (75%)

7. expense = $0.2x$

sell = $1x$

$x = \# \text{ of cookies}$

Profit = $1x - 0.2x$

Profit = $0.8x$

(C)

4. $\frac{5}{12} = 0.4\%$

12

(C)

8. $2x + 5 + 8x - 5 = 180$

$10x = 180$

$x = 18$

may = $8x - 5$

$= 8(18) - 5$

may = 139 (C)

NC Final Quiz Bowl → Round 3

1. $5x + 2 + 3x - 2 = 60$

$8x = 60$

$x = 7.5$

$m\angle ABD = 5(7.5) + 2$

$m\angle ABD = 39.5$

(D)

4. $A = \frac{(d_1)(d_2)}{2}$ $45 = \frac{(2x)(5x)}{2}$

$90 = 10x^2$

$x^2 = 9$

$x = 3$

$2(3) = 6$

$5(3) = 15$ ← Long

(A)

5. Exterior Angle Theorem

2. $8x - 2 = 5x + 10$

$3x = 12$

$x = 4$

$8(4) - 2 = 30$

$180 - 30 = 150$

$m\angle 1 = 150^\circ$

(B)

$90 + x = 120$

$x = 30^\circ$ Forget the MC.

6. $350 = \frac{30x^2 - 30x + 150}{10}$

$35 = 3x^2 - 3x + 15$

$0 = 3x^2 - 3x - 20$

$x = \frac{3 \pm \sqrt{(-3)^2 - 4(3)(-20)}}{2(3)}$

$x = \frac{3 \pm \sqrt{249}}{6}$ $x = \frac{3 \pm 15.8}{6}$

$x = \frac{3 + 15.8}{6} = 3.1$ $x = \frac{3 - 15.8}{6} = -2.1$

(D)

3. $2l + 2w = P$

Length = $2w + 5$

width = w

$2(2w + 5) + 2w = 40$

$4w + 10 + 2w = 40$

$6w = 30$

$w = 5$

Length = $2(5) + 5 = 15$

(C)

7. red = 5
blue = 6
white = 9
Total = 26

$$\left(\frac{5}{20}\right)\left(\frac{6}{19}\right) = \frac{30}{380}$$

7.89%
(B)

8. $\frac{8}{1^{\text{st}}}$ $\frac{7}{2^{\text{nd}}}$ $\frac{6}{3^{\text{rd}}}$ $\frac{5}{4^{\text{th}}}$ $\frac{4}{5^{\text{th}}}$ $\frac{3}{6^{\text{th}}}$ $\frac{2}{7^{\text{th}}}$ $\frac{1}{8^{\text{th}}}$

$8! = 40,320$
(A)

Round 4

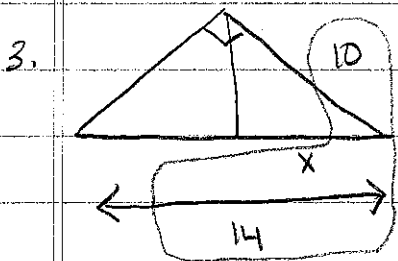
1. $\frac{1}{20}$ $\frac{1}{20}$ $\frac{19}{20}$ $\frac{19}{20}$

prob. of 2 correct
prob. of 2 incorrect

2.

	A	NO A	Total	
TSA	10	20	30	30
NO TSA	15	0	15	+25
Total	25	20	45	-10
				45

$$\frac{10}{25} = \frac{2}{5} \text{ or } 2:5$$



$$\frac{10}{x} = \frac{14}{10}$$

$$100 = 14x$$

$$x = 7.1$$

(B)

4. inverse variation

$$y = \frac{k}{x} \quad \begin{array}{l} y = \text{time} \\ x = \text{rate} \end{array}$$

$$30 = \frac{k}{55} \quad k = 1650$$

$$y = \frac{1650}{65} = 25.4$$

(C)

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

$$\begin{aligned} f(2x+5) &= (2x+5)^2 - 3 \\ &= (2x+5)(2x+5) - 3 \\ &= 4x^2 + 10x + 10x + 25 - 3 \end{aligned}$$

$$(f \circ g)(x) = 4x^2 + 20x + 22$$

6. $f^{-1}(x) = \text{inverse}$

$$y = x^2 - 3$$

$$x = y^2 - 3$$

$$x + 3 = y^2$$

$$y = \sqrt{x+3}$$

7. $F = 0.5 \text{ mV}^2$

$$9000 = 0.5(200)V^2$$

$$9000 = 100V^2$$

$$90 = V^2$$

$$V = 9.5$$

(A)

8. max-values = y of vertex

$$f(x) \text{ vertex} = (1.8, 66.25)$$

$$g(x) = -10x^2 + 90x + 5$$

$$g(x) \text{ vertex} = (2.8, 131.5625)$$

$$66.25^2 = 4389.06$$

$$131.5625^2 = 17308.69$$

$$\text{sum} = 21697.8$$

(D)

Round 5

$$1. \quad \overline{CF} = \sqrt{(15-12)^2 + (20-10)^2} \quad \overline{LF} = \sqrt{(15-9)^2 + (20-18)^2}$$

$$= \sqrt{3^2 + 10^2} \quad = \sqrt{6^2 + 2^2}$$

$$= \sqrt{9+100} \quad = \sqrt{36+4}$$

$$= \sqrt{109} \quad = \sqrt{40}$$

Approximate

$\overline{CF} = \sqrt{109}$	4.65	17	1.89	19	1163	(D)
$\overline{LF} = \sqrt{40}$		9		11		

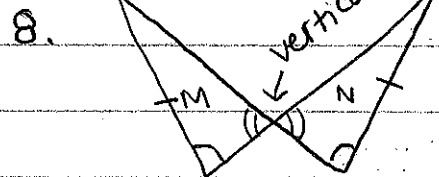
2. $60 + 40 - 20 = 80$
(B)

7. $d = rt$
 $d = (55)(15)$
 $d = 825 = K$

3. $\frac{1}{6}, \frac{1}{6}, \frac{1}{6}, \frac{5}{6}, \frac{5}{6}, \frac{5}{6}$
 $\frac{125}{1679616} = 0.007\%$

$825 = 75t$
 $t = 11$
 (A)

4. $\left(\frac{1}{10}\right)\left(\frac{4}{9}\right) = \frac{4}{90} = 4.4\%$
 (A)
 1, 3, 5, X, 9

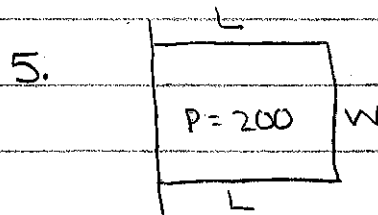
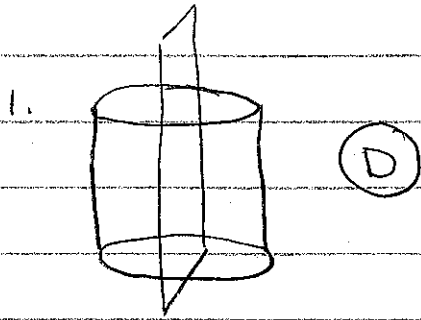


SAA
(A)

5. $f(x) = |x+5| + 2$
(B)

6. $x = -3 \quad x = 5$
 $x+3=0 \quad x-5=0$
 $(x+3)(x-5) = 0$
 $x^2 - 2x - 15 = 0$
 (A)

Round 6



$$2L + W = 200$$

$$A = LW$$

$$W = 200 - 2L$$

$$A = L(200 - 2L)$$

$$A = 200L - 2L^2$$

$$\text{max} = 5000$$

$$A = -2L^2 + 200L$$

(C)

graph, find max

2. $y = a(1-r)^t$
 \downarrow
 0.87

$$1-r = 0.87$$

$$-r = -0.13$$

$$r = 0.13 \text{ or } 13\%$$

$$\frac{13}{19} = 1.11\% \text{ (A)}$$

6. $(10x^2 - 8xy - 2xy + y^2)$
 $8x(2x-y) - y(2x-y)$
 $(8x-y)(2x-y)$

(B)

3. $9x - 5 = 4x + 10$

$$5x - 5 = 10$$

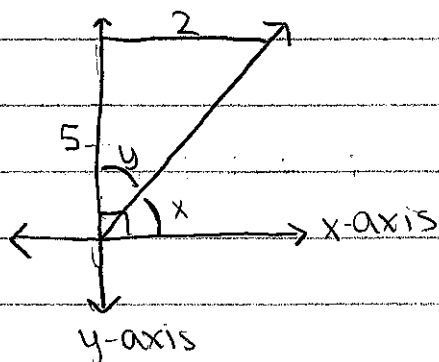
$$5x = 15$$

$$x = 3$$

$$9(3) - 5 = 22$$

$$180 - 22 = 158^\circ$$

(D)



$$\tan x = \frac{2}{5}$$

$$\tan^{-1}(2/5) = 21.8$$

$$x = 90 - 21.8$$

$$x = 68.2$$

(A)

7. $\frac{5}{12} = 0.4\%$ (C)

8. $y = -16x^2 + 300x + 40$

graph find max

$$1446.25$$

(D)

Round 7

1. $90 = 2\sqrt{5x}$
 $45 = \sqrt{5x}$
 $2025 = 5x$
 $x = 405$

(C)

2. $PF = \sqrt{(9-5)^2 + (25-35)^2}$ $LF = \sqrt{(15-9)^2 + (10-25)^2}$
 $= \sqrt{(4)^2 + (-10)^2}$ $= \sqrt{6^2 + (-15)^2}$
 $= \sqrt{16 + 100}$ $= \sqrt{36 + 225}$
 $= \sqrt{116}$ $= \sqrt{261}$

$$\frac{PF}{LF} = \frac{\sqrt{116}}{\sqrt{261}} = \frac{2}{3} \quad (A)$$

3. $\frac{14}{+12} = \frac{26}{-21}$ $\frac{26}{5}$ (C)

4.

	N	NON	T
M	0.12	0.28	0.4
no M	0.16	0	0.16
T	0.28	0.28	0.56

$$P(N) \cdot P(M) = P(N|M)$$

$$\left(\frac{0.28}{0.56}\right) \left(\frac{0.4}{0.56}\right) = \left(\frac{0.12}{0.4}\right)$$

$$(0.5)(0.714) = 0.3$$

$$0.357 = 0.3$$

NO! (B)

$$5. (3x^5 + 17x^3 - 1) + (-2x^5 - 6)$$

$$3x^5 - 2x^5 + 17x^3 - 1 - 6$$

$$1x^5 + 17x^3 - 7$$

(A)

$$8. f(x) = -16x^2 + 42x + 12$$

$$\text{max} = 39.5625$$

$$g(x) = -10x^2 + 40x + 9$$

$$\text{max} = 34$$

$$6. x + y = 24 \rightarrow x = 24 - y$$

$$x^2 + y^2 = 306$$

$$(24 - y)^2 + y^2 = 306$$

$$(24 - y)(24 - y) + y^2 = 306$$

$$576 - 48y + y^2 + y^2 = 306$$

$$2y^2 - 48y + 270 = 0$$

$$y^2 - 24y + 135 = 0$$

$$(y - 15)(y - 9) = 0$$

$$y = 15 \quad y = 9$$

$$(15)(9) = 135$$

(C)

$$39.56 - 34 = 5.56$$

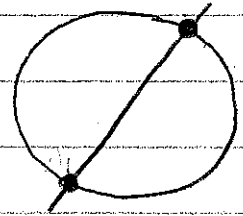
(D)

7. graph: find the one that touches x-axis once.

(B)

Round 8

1. $x^2 + y^2 = 225$ $x - 7y = -75$
 \uparrow $x = 7y - 75$



$$(7y - 75)^2 + y^2 = 225$$

$$(7y - 75)(7y - 75) + y^2 = 225$$

$$49y^2 - 1050y + 5625 + y^2 = 225$$

$$50y^2 - 1050y + 5400 = 0$$

$$y^2 - 21y + 108 = 0$$

$$(y - 12)(y - 9) = 0$$

$$y = 12 \quad y = 9$$

$$x = 7(12) - 75 = 9$$

$$(9, 12)$$

$$x = 7(9) - 75 = -12$$

$$(-12, 9)$$

(A)

2. $V = \frac{K}{P}$ $175 = \frac{K}{3.2}$

$$400 = \frac{560}{P}$$

$$P = \frac{560}{400}$$

(B)

$$K = 560$$

$$P = 1.4$$

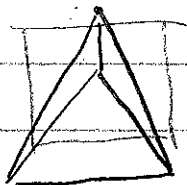
3. $y = \text{cost per DVD}$
 $x = \text{produce DVDs}$

$$y = \frac{1.25x + 247000}{x}$$

Average (D)

4. independent events b/c of replacement \rightarrow (C)

5.



(D)

6. $28t^2 - 30t + 160 = 200$

$$28t^2 - 30t - 40 = 0$$

graph, find x-int.

$$x = -0.77 \quad x = 1.84$$

(D)

7. graph each

(A)

8. $2x - 3 = 0$

$$2x = 3$$

$$x = 1.5$$

" $x - 2 = 0$

$$x = 2$$

facing up (+a)

(B)

Round 9

1. (B)

$$7. y = a(1-r)^t$$

↓

2. (C)

$$(0.82)$$

$$1-r = 0.82$$

$$-r = -0.18$$

$$r = 0.18 \text{ or } 18\%$$

3. $y = (x-2)^2 + 5$

$$y = (x-2)(x-2) + 5$$

$$y = x^2 - 4x + 4 + 5$$

$$y = x^2 - 4x + 9$$

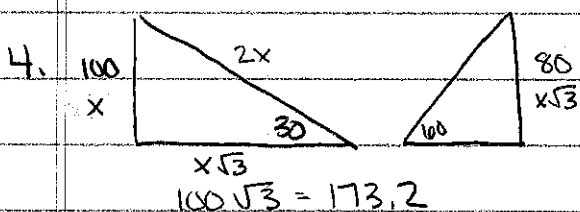
(A)

(D)

12

1.5%

(A)



$$80 = x\sqrt{3}$$

$$x = \frac{80}{\sqrt{3}} = 46.2$$

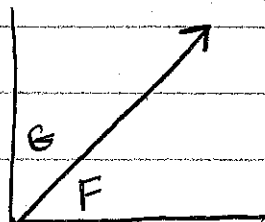
$$HJ = 173.2 + 46.2 = 219.4$$

(C)

6. $(7m^2 + 14m)(-tm - 2t)$
 $-7m(m+2) - t(m+2)$
 $(-7m-t)(m+2)$

(C)

5. start picking #'s



(B)

8. $\frac{16^{\frac{2}{2}} \times \frac{3}{12} y^{-\frac{10}{2}}}{x^{-\frac{3}{12}} y^{\frac{10}{2}}} = \frac{64 x^{\frac{1}{4}} x^{\frac{1}{4}}}{y^9 y^3}$

$$\frac{64 x^{1/2}}{y^{12}} = (D)$$

Round 10

1. $(x-1)(x-4) = 0$

$$x^2 - 5x + 4$$

$$x = \frac{5 \pm 2.5}{2}$$

No.

(E)

$(x+8)(x-12)$

$$x^2 - 4x - 96 = 0$$

$$x = \frac{4 \pm 2}{2}$$

$$y = 2^2 - 4(2) - 96$$

$$y = -100$$

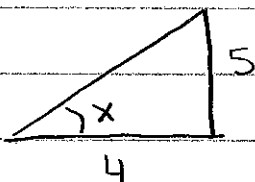
$x(x-4) = 0$

$$x^2 - 4x = 0$$

$$x = \frac{4 \pm 2}{2}$$

$$y = 2^2 - 4(2) = -4$$

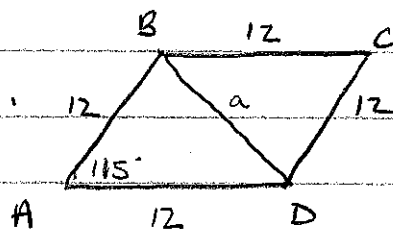
2.



$$\tan x = \frac{5}{4}$$

$$x = 51.3^\circ \quad (C)$$

3.



$$a^2 = 12^2 + 12^2 - 2(12)(12)\cos 115$$

$$a^2 = 409.7$$

$$a = 20.24 \quad (E)$$

4.

$$\left(\frac{2}{5}\right)\left(\frac{3}{5}\right) = \frac{6}{25} = 24\%$$

(B)

5. $\frac{3}{36} = \left(\frac{1}{12}\right)\left(\frac{1}{6}\right) = \frac{1}{72}$

(B)

6.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	(8)
3	4	5	6	7	(8)	9
4	5	6	7	(8)	9	10
5	6	7	(8)	9	10	11
6	7	(8)	9	10	11	12

$$P(B) = 5/36$$

$$P(A|B) = 2/5$$

(D)

$$7. y = \frac{k}{x}$$

$$9 = \frac{3.6}{x}$$

$$x = \frac{3.6}{9}$$

$$x = 0.4$$

(B)

$$8. y = kx$$

$$A = kg$$

(B)


Round 11

1. $I = \frac{E}{5R}$

$\frac{5IR}{5I} = \frac{E}{5I}$

$R = \frac{E}{5I}$

(D)

2. 
 $(3, 10)$ $(-5, 2)$ (x_2, y_2)

$$x_m = \frac{x_2 + x_1}{2} \quad y_m = \frac{y_2 + y_1}{2}$$

$$-5 = \frac{3 + x}{2} \quad 2 = \frac{10 + y}{2}$$

$$-10 = 3 + x \quad 4 = 10 + y$$

$$-13 = x$$

$$-6 = y$$

3. (D)

(C)

4. K is negative b/c the graph is moving downwards
n is odd (cubic function).

(D)

5. A \rightarrow true

B \rightarrow true

C \rightarrow C = $8(8) + 4(12)$

C = 112 true

D \rightarrow C = $8(15) + 4(16)$

= 192 yes

E \rightarrow C = $20(8) + 4(15)$

= 220 NO!

(E)

b. perpendicular = $\frac{3}{2}$

$$kx + by = 10$$

$$y\text{-int} = \frac{10}{b} = \frac{5}{3}$$

$$\left[y = \frac{3}{2}x + \frac{5}{3} \right] b$$

$$6y = 9x + 10$$

$$-9x + 6y = 10$$

(A)

$$7. \left(\frac{1}{6}\right)\left(\frac{1}{6}\right)\left(\frac{5}{6}\right)\left(\frac{5}{6}\right)\left(\frac{5}{6}\right)\left(\frac{5}{6}\right)\left(\frac{5}{6}\right)\left(\frac{5}{6}\right)\left(\frac{5}{6}\right)\left(\frac{5}{6}\right) = \frac{5^8}{6^{10}} = \frac{390625}{60466176}$$

$$x = 0.10\%$$

$$8. f(g(x))$$

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

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

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

$$= 2x^2 + 4x + 2 \quad \textcircled{D} \quad (-\infty, \infty)$$

