

Name: QIXUAN HE

Perm: 3666948

Math 34A Midterm 2

(100 pts total)

1. (6 pts) Use the log table provided with this exam to find  
(a) (4 pts)  $10^{1.820}$
- 

66.06934...

(b) (8 pts)  $\log(9.973/8.980)$

$$\begin{aligned} & \Rightarrow \log\left(\frac{9.973}{8.980}\right) \\ & = \log(9.973) - \log(8.980). \end{aligned}$$

0.04554

(c) (12 pts)  $\log(\sqrt[5]{537})$

$$\begin{aligned} & = \log_{10}(537^{\frac{1}{5}}) \\ & = \frac{1}{5} \log_{10}(537). \end{aligned}$$

0.54599.

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$10^{2x-3} = 2^{10}$$

$$\Rightarrow (2x-3) \log 10 = 10 \log(2)$$

$$x = \frac{10 \log(2) + 3 \log(10)}{2 \log(10)}$$

$$x =$$

$$3.00514$$

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$$\begin{cases} 3 = -4m + b \\ 5 = -2m + b \end{cases} \rightarrow -2 = -2m \quad m = 1 \quad \therefore b = \frac{17}{5}$$

$$-13 + \frac{17}{5} = \frac{31}{5} \quad 5 = -2 + b \quad b = 7$$

$$y =$$

$$x + 7$$

- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$$y = \frac{3}{5}x + b$$

$$\Rightarrow 10 = \frac{3}{5} \cdot 4 + b$$

$$10 - \frac{12}{5} = b \quad \frac{38}{5} = b$$

$$y =$$

$$\frac{3}{5}x + \frac{38}{5}$$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$\begin{cases} y = x - 8 \\ y = 1 - \frac{1}{2}x \end{cases} \Rightarrow x - 8 = 1 - \frac{1}{2}x$$

$$\frac{3}{2}x = 9$$

$$x = 9 \times \frac{2}{3}$$

$$= 6$$

$$y = -2$$

$$(x, y) = (6, -2)$$

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?

$$\text{Can B} : 16B + 4R = 100\%$$

$$\Rightarrow 8B + 2R = 50\%$$

$$\text{Can A} : 8B + 2R + 4R$$

$$R = \frac{4}{20} = \frac{20}{100}$$

$$B = \frac{16}{20} = \frac{80}{100}$$

$$50\% = \frac{50}{100} = \frac{10}{20}$$

$$X \frac{10}{20} = \frac{48}{100}$$

$$10X = 48$$

$$X = \frac{48}{10}$$

$$\frac{X}{10} = \frac{20}{100}$$

$$8 \quad L$$

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

(a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$$\begin{aligned}
 \text{average speed} &= \frac{t_1^2 - t_2^2}{t_1 - t_2} \\
 &= \frac{(1.2)^2 - 1^2}{1.2 - 1} \\
 &= \frac{0.44}{0.2} \\
 &= 2.2
 \end{aligned}$$

|     |       |
|-----|-------|
| 2.2 | $m/s$ |
|-----|-------|

(b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1 + h$  seconds.

$$\begin{aligned}
 \text{average speed} &= \frac{t^2 - t'^2}{t_1 - t_2} \\
 &= \frac{(1+h)^2 - 1^2}{1+h - 1} \\
 &= \frac{h(h+2)}{h} \\
 &= h+2
 \end{aligned}$$

$$\begin{aligned}
 (1+h)(1+h) &= 1+2h+h^2-1 \\
 &= 2h+h^2 \\
 &= h(h+2)
 \end{aligned}$$

|       |       |
|-------|-------|
| $h+2$ | $m/s$ |
|-------|-------|

(c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

$$s = \frac{d}{t} = \frac{1^2}{1} = 1 \text{ m/s.}$$

6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ).

$$\Rightarrow (10+h) \Rightarrow 500 - 10h$$

500 - 10h cards

- (b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)$ ¢ each. Please simplify your answer (it should be in terms of  $h$ ).

$$\begin{aligned} \text{total money} &= (10+h)(500 - 10h) \\ &= 5000 - 100h + 500h - 10h^2 \\ &= 5000 + 400h - 10h^2 \end{aligned}$$

5000 + 400h - 10h<sup>2</sup> ¢

7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2}$$

$$n=4 \quad \frac{4(5)}{2} = 10$$

$$n=5 \quad \frac{5(6)}{2} = 15$$

$$n=6 \quad \frac{6(7)}{2} = 21$$

46.

$$\text{Sum} = 10 + 15 + 21 = 46$$

8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

$$\Rightarrow \frac{24h + 3h^2}{h}$$

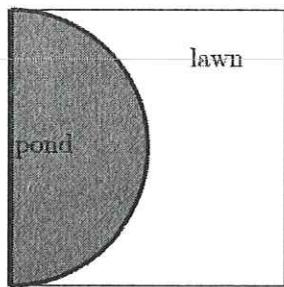
$$= \frac{h(24+3h)}{h}$$

$$= 24 + 3h$$

when  $h \rightarrow 0$ , equation  $\lim = 24$

24.

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



$$\ell^2 = 900$$

$$\ell = 30$$

$$\begin{aligned}\text{Area pond} &= \frac{\pi r^2}{2} = \frac{\pi 15^2}{2} \\ &= \frac{225\pi}{2}\end{aligned}$$

$$\begin{array}{r} 15 \\ \times 15 \\ \hline 75 \\ 15 \\ \hline 225\pi \end{array}$$

$$\begin{aligned}\text{Area lawn} &= \text{Area garden} - \text{Area pond} \\ &= 900 - \frac{225\pi}{2}\end{aligned}$$

|             |                          |              |
|-------------|--------------------------|--------------|
| lawn area = | $900 - \frac{225\pi}{2}$ | $\text{m}^2$ |
|-------------|--------------------------|--------------|

Name:

Perm:

Math 34A Midterm 2

(100 pts total)

1. (6 pts) Use the log table provided with this exam to find

(a) (4 pts)  $10^{1.820}$

$$\log = 10^1 \times \text{Antilog}(0.820)$$

$$= 10 \times 6.61$$

$$\begin{array}{r} .11 \\ 8.980 \longdiv{9.9730} \\ 8980 \\ \hline .9930 \\ 8980 \\ \hline 50 \end{array}$$

(b) (8 pts)  $\log(9.973/8.980)$

66.1

$$\log(9.973) - \log(8.980)$$

$$= 0.9987 - 0.9533$$

=

0.0454

(c) (12 pts)  $\log(\sqrt[5]{537})$

$$\begin{array}{r} 2.7300 \\ \times 0.2 \\ \hline 0.54600 \end{array}$$
$$\begin{aligned} &= \log(537^{\frac{1}{5}}) \\ &= \frac{1}{5} \log(537) \\ &= \frac{1}{5} \times 2.7300 \\ &= 0.2 \times 2.7300 \end{aligned}$$

0.546

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$10^{2x-3} = 2^{10}$$

$$\log(10^{2x-3}) = \log(2^{10})$$

$$(2x-3)\log(10) = 10\log(2)$$

$$2x-3 = \frac{10\log(2)}{\log(10)}$$

$$2x = 3 + \frac{10\log(2)}{\log(10)}$$

$$x = \frac{3 + \frac{10\log(2)}{\log(10)}}{2}$$

$x =$  3.005

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$$\begin{cases} -4m+b=3 \\ -2m+b=5 \end{cases}$$

$$-4m+b+2m-b=-2$$

$$-2m=-2$$

$$m=1$$

$$b=3+4m=7$$

$y =$  x + 7

- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$$y = \frac{3}{5}x + b$$

$$\frac{3}{5} \times 4 + b = 10$$

$$b = 10 - \frac{12}{5} = \frac{50}{5} - \frac{12}{5} = \frac{38}{5}$$

$y =$   $\frac{3}{5}x + \frac{38}{5}$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$x - 8 = 1 - \frac{1}{2}x$$

$$2x - 16 = 2 - x$$

$$3x = 18$$

$$x = \frac{18}{3}$$

$$y = \frac{18}{3} - \frac{24}{3} = -\frac{6}{3} = -2$$

$$\frac{18}{3} - \frac{24}{3} = -\frac{6}{3} = -2$$

$$1 - \frac{1}{2} \cdot \frac{18}{3} = \frac{6}{6} - \frac{18}{6} = -\frac{12}{6} = -2$$

$$(x, y) = \left( \frac{18}{3}, -2 \right)$$

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?

$$\begin{aligned} A &: 8R \\ B &: 16B \end{aligned} \quad \left. \begin{array}{l} \\ \downarrow \end{array} \right\} 4R.$$

$$\therefore B : 16B + 4R \quad \left. \begin{array}{l} \\ \downarrow \end{array} \right\} 8B + 2R$$

$$\therefore A : 4R + 2R + 8B = 6R + 8B$$

8

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5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

- (a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$$\text{Speed} = \frac{d}{t}$$

$$f(t) = t^2$$

$$\frac{fd}{ft} = \frac{f(1.2) - f(1)}{1.2 - 1}$$

$$= \frac{1.2^2 - 1^2}{0.2}$$

$$= \frac{1.44 - 1}{0.2}$$

$$= \frac{0.44}{0.2}$$

$$=$$

$2.2$   
 $m/s$

- (b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1 + h$  seconds.

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

$$= \frac{1+h^2 + 2h - 1}{h}$$

$$= h + 2$$

$h + 2$   
 $m/s$

- (c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

To find the tangent line that <sup>(slope)</sup> exactly meets the point of 1 second after balloon was dropped ( $t=1$ ).

6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

(a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ).

$$\begin{array}{ll}
 \text{10 cents} & \text{500 cards} \\
 \\
 \text{10 + } h & \text{500 - } \cancel{10h} \\
 & \cancel{+h} \\
 \text{if 12 cents:} & \underline{(n-10) \cancel{+10}} \\
 \\
 500 - 2 \times 10 & \\
 = 500 - 20 & \\
 = 480 &
 \end{array}$$

$500 - 10h$  cards

(b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)$ ¢ each. Please simplify your answer (it should be in terms of  $h$ ).

$$\begin{aligned}
 & 10 + h \\
 & (500 - 10h)(10 + h) \\
 & = 5000 + 500h - 100h - 10h^2 \\
 & = 5000 + 400h - 10h^2
 \end{aligned}$$

$5000 + 400h - 10h^2$  ¢

7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2}$$

$$= \frac{4(4+1)}{2} + \frac{5(5+1)}{2} + \frac{6(6+1)}{2}$$

46

$$= \frac{4 \times 5}{2} + \frac{5 \times 6}{2} + \frac{6 \times 7}{2}$$

$$= \frac{20}{2} + \frac{30}{2} + \frac{42}{2}$$

$$= 10 + 15 + 21$$

$$= 25 + 21$$

$$= 46$$

8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

$$= \frac{24h+3h^2}{h}$$

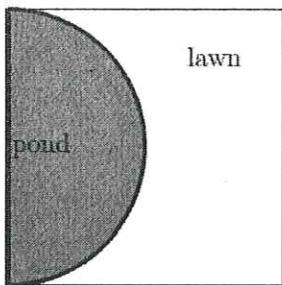
$$= 24 + 3h$$

when  $h \rightarrow 0$

$$= 24$$

24

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



$$\ell^2 = 900$$

$$\ell = 30$$

$$S_{\text{pond}} = \frac{\pi r^2}{2} = \frac{\pi \cdot 15^2}{2} = \frac{225\pi}{2}$$

$$S_{\text{lawn}} = 900 - \frac{225\pi}{2}$$

$$\begin{array}{r} 2 \\ \times 15 \\ \hline 15 \\ + 15 \\ \hline 225 \end{array}$$

lawn area =  $900 - \frac{225\pi}{2}$   $\text{m}^2$

Name: Breanna Flores

Perm: 4283842

Math 34A Midterm 2

(100 pts total)

1. (6 pts) Use the log table provided with this exam to find

(a) (4 pts)  $10^{1.820}$

$$10^1 \cdot 10^{0.820} \rightarrow 6.60 \times 10^1$$

$$6.60 \times 10^1$$

(b) (8 pts)  $\log(9.973/8.980)$

$$\log(9.973) - \log(8.980)$$

$$0.9987 - 0.9533$$

$$0.0454$$

$$4.54 \times 10^{-2}$$

$$\begin{array}{r} 0.9987 \\ - 0.9533 \\ \hline 0.0454 \end{array}$$

$$4.54 \times 10^{-2}$$

(c) (12 pts)  $\log(\sqrt[5]{537})$

$$\log(\sqrt[5]{537})$$

$$\frac{1}{5} \log(537)$$

$$\frac{1}{5} \log(5.37) + \log(10^2)$$

$$\frac{1}{5} (2.7300) = .5460$$

$$\begin{array}{r} 5 | 2.7300 \\ -25 \\ \hline 23 \\ -25 \\ \hline -20 \end{array}$$

$$5.46 \times 10^{-1}$$

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$10^{2x-3} = 2^{10}$$

$$\frac{(2x-3)\log(10)}{\log(10)} = \frac{10\log(2)}{\log(10)} \rightarrow 2x-3 = \frac{10\log(2)}{\log(10)}$$

$$\begin{array}{r} .3010 \\ \times 10 \\ \hline 3.010 \end{array}$$

$$2x-3 = 10(0.3010)$$

$$\begin{array}{r} 2x-3 = 30.10 \\ +3 \quad +3 \\ \hline 2x = 33.10 \end{array}$$

$$\frac{2x}{2} = \frac{33.10}{2}$$

$$x = 16.55$$

$$\begin{array}{r} 16.55 \\ 2 \boxed{33.10} \\ -2 \\ \hline 13 \\ -12 \\ \hline 1 \\ -10 \\ \hline 10 \end{array}$$

$$16.55$$

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$$\begin{array}{l} x_2 \ y_2 \\ \hline y_2 - y_1 \rightarrow \frac{5-3}{-2+4} = \frac{2}{2} \rightarrow 1 = m \\ x_1 \ y_1 \\ \hline 5 = 1(-2) + b \\ 5 = -2 + b \\ +2 \quad +2 \\ 7 = b \end{array}$$

check:

$$5 = 1(-2) + 7$$

$$5 = -2 + 7$$

$$5 = 5 \checkmark$$

$$y = \boxed{1x+7}$$

- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$$\begin{array}{l} x_1 \ y_1 \\ \hline y = \frac{3}{5}x + b \\ 10 = \frac{3}{5}(4) + b \\ -12 \quad -12 \\ \hline 38 \quad 5 \\ 5 \mid 10 - 6 = 12(5) \\ 5 \mid 50 - 30 = 20 \\ 5 \mid 20 - 15 = 5 \\ 5 \mid 5 - 5 = 0 \end{array}$$

$$\begin{array}{l} 10 = \frac{12}{5}(4) + b \\ 10 = \frac{48}{5} + b \\ 50 - 48 = 5b \\ 2 = 5b \\ \frac{2}{5} = b \end{array}$$

$$y = \boxed{\frac{3}{5}x + \frac{38}{5}}$$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$y = x - 8 = -\frac{1}{2}x + 1 + 8 \rightarrow x = -\frac{1}{2}x + 9$$

$$\cancel{y} - \cancel{x} + 8 \quad \cancel{-\frac{1}{2}x} + 1 + 8 \rightarrow \cancel{\frac{3}{2}x} + \cancel{\frac{1}{2}x} - 2 = 1 - 8$$

$$1x + \frac{1}{2}x = 9$$

$$-\frac{1}{2} = -2 \quad \checkmark$$

$$\frac{1}{1}x \cdot 2 = \frac{2x}{2} + \frac{1}{2}x \rightarrow \left(\frac{3}{2}\right)x = 18$$

$$y = 6 - 8$$

$$y = -2$$

check:

$$\frac{3x}{3} = \frac{18}{3} \quad x = 6$$

$$-2 = 6 - 8$$

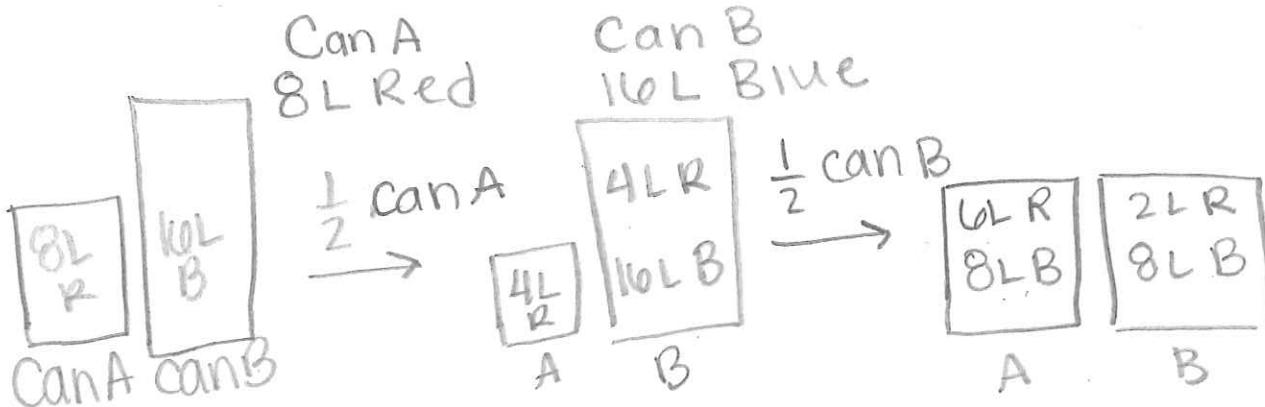
$$-2 = -2 \quad \checkmark$$

$$(x, y) = (6, -2)$$

|  |
|--|
|  |
|--|

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?



|   |
|---|
| 8 |
|---|

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

- (a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$$\frac{(1.2^2) - (1^2)}{1.2 - 1} = \frac{1.44}{0.2} \text{ meters/seconds} \quad 7.2 \text{ m/s}$$

$$\begin{array}{r} 1.2 \\ \times 1.2 \\ \hline 24 \\ 120 \\ \hline 1.44 \end{array} \quad \begin{array}{r} 1.2 \\ - 1.0 \\ \hline .2 \\ 2 \sqrt{14.4} \\ -14 \\ \hline 0.4 \end{array}$$

|     |              |
|-----|--------------|
| 7.2 | $\text{m/s}$ |
|-----|--------------|

- (b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1+h$  seconds.

$$\begin{aligned} & \frac{(1+h^2) - (1^2)}{(1+h) - 1} \rightarrow \frac{h^2 + 2h}{h} \rightarrow \frac{h(h+2)}{h} \rightarrow h+2 \\ & \text{Diagram: A square divided into } n \text{ smaller squares of side length } h. \text{ The total area is } h^2 + 2h + 1. \\ & h^2 + 2h + 1 \end{aligned}$$

|       |              |
|-------|--------------|
| $h+2$ | $\text{m/s}$ |
|-------|--------------|

- (c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

You would need to find out what the limit is as  $n \rightarrow 0$  to find the instantaneous speed exactly 1 second after it was dropped.

6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ).

$$(10+h) \cdot (500 - 10h) =$$

Price  $\times$  # items = total profit

$$10 \cdot 500 =$$

$$\boxed{500 - 10h} \text{ cards}$$

- (b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)$ ¢ each. Please simplify your answer (it should be in terms of  $h$ ).

$$(10+h) \cdot (500 - 10h) =$$

$$\boxed{(10+h) \cdot (500 - 10h)} \text{ ¢}$$

7. (8 pts) Compute the following sum (your answer should be a number).

$$\left( \frac{4(4+1)}{2} \right) + \left( \frac{5(5+1)}{2} \right) + \left( \frac{6(6+1)}{2} \right)$$

$\sum_{n=4}^6 \frac{n(n+1)}{2}$

$$10 + 15 + 21 = 46$$

$25 + 21$

46

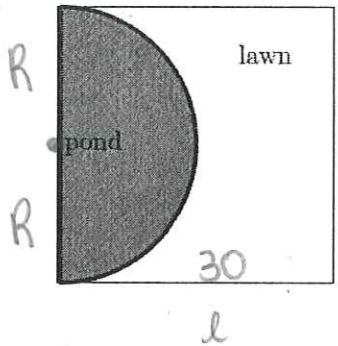
8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

$$\frac{24h+3h^2}{h} \rightarrow \frac{\cancel{h}(24+3\cancel{h})}{\cancel{h}} \rightarrow 24+3\cancel{h} = 24$$

$\uparrow$   
 $\emptyset$

24

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



$$A = 900 \text{ m}^2$$

$$A = x^2$$

$$P = 4x$$

$$A = \frac{1}{2}(\pi r^2)$$

$$C = \frac{1}{2}(2\pi r)$$

$$\sqrt{900} = \sqrt{x^2}$$

$$\text{Area of square} = x^2$$

$$30 = l$$

$$15 = r$$

$$\text{Area of Lawn: } x^2 - \frac{1}{2}(\pi r^2)$$

$$\begin{array}{r} 15 \\ \times 15 \\ \hline 150 \\ 15 \\ \hline 225 \end{array}$$

$$30^2 - \frac{1}{2}(\pi(15)^2) \rightarrow 900 - \frac{1}{2}(225\pi)$$

lawn area =

$$900 - \frac{1}{2}(225\pi) \text{ m}^2$$

Name: Katie Meade

Perm: 816574-8

**Math 34A Midterm 2**

*(100 pts total)*

1. (6 pts) Use the log table provided with this exam to find

$$(a) (4 \text{ pts}) 10^{1.820} = 1.82 \log(10) \log 10^{1.820} = \log x$$

$$\begin{aligned} \log 10^{1.82} &= 1.82 \\ 1.82 (\log 10) &= \log x \\ 10^{1.820} (1) &= \log x \\ 10^{1.820} &= \log x \\ 10^{1.820} &= 10^{1+0.82} \\ 10^1 \times 10^{0.82} &= 10^{(1+0.82)} \\ 10 \times 10^{0.82} &= 10^{1+0.82} \\ 10^{1+0.82} &= 10^{1+0.601} \\ 10^{1+0.601} &= 10^{6.601} \\ 10^{6.601} &= 66.10 \end{aligned}$$

$$\begin{array}{r} 10^{6.601} \\ \hline 10^6 \quad 1 \\ \hline 10^1 \quad 0 \end{array}$$

$$(b) (8 \text{ pts}) \log(9.973/8.980)$$

$$\log(9.973) - \log(8.980)$$

$$\log(9.9 \times (7.3 \times 10^{-2})) - \log(8.9 \times (8.0 \times 10^{-2}))$$

$$\begin{array}{r} 0.9956 \\ - 0.9490 \\ \hline -0.1479 \end{array}$$

$$(0.9956 + -2 + 0.8633) - (0.949 + (0.9031 - 2))$$

$$\begin{array}{r} 0.9956 \\ - 0.9490 \\ \hline -0.8633 \end{array} \quad \begin{array}{r} 0.8633 \\ - 0.9031 \\ \hline -0.1411 \end{array} \quad \begin{array}{r} 0.1411 \\ - (-0.1479) \\ \hline 0.0068 \end{array}$$

$$\begin{array}{r} 0.9956 \\ - 0.9490 \\ \hline -0.8633 \end{array} \quad \begin{array}{r} 0.8633 \\ - 0.9031 \\ \hline -0.1411 \end{array} \quad \begin{array}{r} 0.1411 \\ - (-0.1479) \\ \hline 0.0068 \end{array}$$

$$(c) (12 \text{ pts}) \log(\sqrt[5]{537})$$

$$\frac{1}{5} \log(537)$$

$$\frac{1}{5} \log(5.37 \times 10 \times 10)$$

$$\frac{1}{5} (0.7300 + 2)$$

$$\begin{array}{r} 0.7300 \\ + 2 \\ \hline 2.7300 \end{array}$$

$$\begin{array}{r} 2.7300 \\ \hline 2.73 \\ - 2.5 \\ \hline 20 \\ \hline 30 \end{array}$$

$$\frac{1}{5} \log(5.37 \times 10 \times 10)$$

$$\frac{1}{5} (0.7300 + 2)$$

$$\begin{array}{r} 0.7300 \\ + 2 \\ \hline 2.7300 \end{array}$$

$$\begin{array}{r} 2.7300 \\ \hline 2.73 \\ - 2.5 \\ \hline 20 \\ \hline 30 \end{array}$$

$$0.5460$$

$$0.5460$$

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$10^{2x-3} = 2^{10}$$

$$\begin{aligned} \frac{x}{2} &> 5^m \\ \frac{3}{2} &> 6 \\ \frac{6}{2} &> 7 \\ \frac{6.4}{2} &> 8 \\ \frac{12.8}{2} &> 9 \\ \frac{25.6}{2} &> 10 \\ \frac{51.2}{2} &> 11 \\ \frac{102.4}{2} &> 12 \\ \log(102.4) &= 1024 \\ \log(1.024 \times 10^3) &= \log(1.024) + 3 \\ 2x-3 &= 0.0080 + 3 \\ 2x-3 &= 3.0080 \\ 2x &= 3.0080 \\ x &= 1.504 \\ 3.005 &= x \end{aligned}$$

$$\frac{(2x-3)\log 10}{\log 10} = \frac{10\log 2}{\log 10}$$

$$\frac{2x-3}{10} = \frac{\log 2}{\log 10}$$

$$(10) \frac{2x-3}{10} = \frac{0.3010}{1} \quad (10)$$

$$2x-3 = 3.010$$

$$2x = 6.010$$

$$x = 3.005$$

$$\begin{aligned} \frac{10(0.3010)}{10} &= 3.0043 \\ 2x-3 &= 3.010 \\ 2x &= 6.010 \\ x &= 3.005 \end{aligned}$$

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$$(-4, 3)(-2, 5)$$

$$\frac{5-3}{-2-(-4)} = \frac{2}{2} \quad m=1$$

$$\begin{aligned} y &= x + b \\ 5 &= -2 + b \\ +2 &+2 \\ 7 &= b \\ b &= 7 \end{aligned}$$

$$(-4, 3)(-2, 5)$$

$$\frac{5-3}{-2+4} = \frac{2}{2} = 1$$

$$\begin{aligned} y &= x + b \\ 5 &= -2 + b \\ +2 &+2 \\ 7 &= b \end{aligned}$$

$$y = x + 7$$

$$y = x + 7$$

- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$$m = \frac{3}{5}$$

$$\frac{10-6}{4-2} = \frac{4}{2} = 2$$

$$\frac{4-6}{4-2} = \frac{-2}{2} = -1$$

$$y = \frac{3}{5}x + b$$

$$y = \frac{3}{5}x + \frac{38}{5}$$

$$10 = \frac{3}{5}(4) + b$$

$$y = \frac{3}{5}x + b$$

$$\frac{50}{5} = \frac{12}{5} + b$$

$$10 = \frac{3}{5}(4) + b$$

$$\frac{50}{5} = \frac{12}{5} + b$$

$$\frac{12}{5} + b$$

$$y = \frac{3}{5}x + \frac{38}{5}$$

$$\frac{50}{5} = b$$

$$\frac{50}{5} = \frac{12}{5} = b$$

$$\frac{38}{5} = b$$

$$y = \frac{3}{5}x + \frac{38}{5}$$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$x - 8 = 1 - \frac{1}{2}x$$

-1 -1

$$y = 18 - 8$$

$$y = 10$$

$$y = 6 - x$$

$$2(x - 9) = \frac{1}{2}x(2)$$

$$2x - 18 = x \\ -2x$$

$$\frac{-18}{3} = -x$$

$$y = 1 - \frac{1}{2}(18)$$

$$y = 9$$

$$y = -2$$

$(6, -2)$

$$x - 8 = 1 - \frac{1}{2}x$$

$$\frac{3}{2}x = 9$$

$$\left(\frac{2}{3}\right)\frac{3}{2}x = \left(\frac{2}{3}\right)9$$

$$\frac{18}{3} = 6 = x$$

$(2, 0)$

$(1, -1)$

$(0, -2)$

$6 = x$

$(x, y) = (6, -2)$

$(-7, 1) (-4, 2) (-5, 3) (-4, 4) (-3, 5) (-2, 6) (-1, 7) (0, 8)$

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?

Can A

8 L red

4 R

+ 10 L

4 R + 10 L

$4R + (8B + 2R)$

$6R + 8B$

Can B

16 L Blue + 4 L red

20 L Blue + red

$B + 2$

B R

8 Liters Blue

L

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

- (a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$$\text{speed} = \frac{\Delta y}{\Delta x}$$

$$f(t) = t^2$$

$$t_1 = 1 \quad DT = 0.2 \\ t_2 = 1.2$$

$$\frac{1.2 - 1}{1.44 - 1} = \frac{0.2}{0.44}$$

$$f(1) = 1$$

$$\frac{1.2 - 1}{(1.2)^2 - 1}$$

$$\begin{array}{r} 0.2 \\ 2 \sqrt{0.44} \\ \hline 0.44 \\ 0.44 \\ 0 \end{array} \quad \boxed{0.22}$$

$$\begin{array}{r} 1.2 \\ \times 1.2 \\ \hline 24 \\ 120 \\ \hline 1.44 \end{array}$$

$$\begin{array}{r} 1.2 \\ \times 1.2 \\ \hline 24 \\ 120 \\ \hline 1.44 \end{array}$$

$$\frac{0.2}{0.44}$$

$$0.2 \sqrt{0.44}$$

$$\boxed{0.22} \quad m/s$$

- (b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1 + h$  seconds.

$$t_1 = 1$$

$$t_2 = 1 + h$$

$$\frac{(1+h)(1+h)}{1+2h+h^2 - 1}$$

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

$$\boxed{\frac{1}{2+h}} \quad m/s$$

- (c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

To find the instantaneous speed of the balloon exactly one second after it was dropped take the derivative of the distance function to find speed and then find the limit as  $x$  approaches 0 to find the instantaneous speed.

6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ).

$$1 \text{ notecard} = 0.10 \text{ cents}$$

$$0.10 \text{ c per card} = 500 \text{ cards sold}$$

$$(0.10 + 0.01c) \neq -10 \text{ notecards}$$

$$(0.10 + 0.01c) \neq 500 - 10c$$

ex. increase by 1 c: probable ans = 490 c

$$(0.10 + 0.01) \neq 500 - 10(1)$$

$$0.11 \neq 500 - 10$$

$$(0.10 + 0.01h) :$$

$$500 - 10(h)$$

$$0.10 + 0.01h = 500 - 10h$$

$$0.10 + 0.01h = 500$$

$$0.10 + 0.01h = 500$$

$$0.01h = 499.9$$

7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2} \rightarrow \frac{4(4+1)}{2} + \frac{5(5+1)}{2} + \frac{6(6+1)}{2}$$

$$\begin{array}{r} 20 \\ 20 \\ \hline 40 \end{array} \quad \begin{array}{r} 30 \\ 30 \\ \hline 60 \end{array} \quad \begin{array}{r} 42 \\ 42 \\ \hline 126 \end{array}$$

$$10 + 15 + 21$$

$$\begin{array}{r} +15 \\ +10 \\ \hline 25 \end{array}$$

46

$$\sum_{n=4}^6 \frac{n(n+1)}{2} \rightarrow \frac{4(5)}{2} + \frac{5(6)}{2} + \frac{6(7)}{2}$$

$$\begin{array}{r} 20 \\ 30 \\ \hline 50 \end{array} \quad \begin{array}{r} 42 \\ 42 \\ \hline 84 \end{array}$$

$$\begin{array}{r} 20 \\ 20 \\ \hline 40 \end{array} \quad \begin{array}{r} 30 \\ 30 \\ \hline 60 \end{array} \quad \begin{array}{r} 42 \\ 42 \\ \hline 84 \end{array}$$

$$\begin{array}{r} 46 \\ 46 \\ \hline 92 \end{array}$$

$$2 \overline{)92} \quad \begin{array}{r} 8 \\ 12 \end{array}$$

8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

$$\frac{48+24h+3h^2-48}{24h+3h^2}$$

$$\frac{\frac{24h+3h^2}{h}}{24+3h}$$

$$\frac{24+3(0)}{24+3} = 24$$

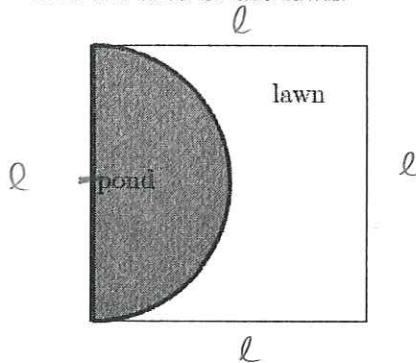
$$\frac{24+3h}{24+3h}$$

$$\lim_{h \rightarrow 0} \frac{(24+3h)}{24+3(0)}$$

24

24

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



$$\pi r^2 \quad r = \frac{1}{2} \ell$$

$$\frac{1}{2} \pi r^2 = \text{area semicircle}$$

$$\frac{1}{2} \pi \left(\frac{1}{2} \ell\right)^2$$

$$\text{Area square} - \text{area pond}$$

$$\sqrt{900} = \ell^2$$

$$900 \text{ m}^2 - \frac{1}{2} \pi \left(\frac{1}{2} \ell\right)^2$$

$$\sqrt{900} = \ell$$

$$900 - \frac{1}{2} \pi \left(\frac{1}{2} \sqrt{900}\right)^2$$

$$900 - \frac{1}{2} \pi (0.25 \ell^2)$$

$$\frac{1}{2} \pi \cdot \frac{1}{4} \ell^2$$

$$900 - \frac{1}{8} \pi \ell^2$$

$$900 - \frac{1}{2} \pi (\sqrt{900})^2$$

$$900 - \frac{1}{2} \pi 900 \quad 2 \sqrt{\frac{450}{10}}$$

$$900 - \frac{900}{2} \pi$$

$$900 - 450 \pi$$

$$\frac{2}{0.3} \\ \underline{0.2} \\ 0.00$$

$$\left(\frac{1}{2} \ell\right) \left(\frac{1}{2} \ell\right)$$

$$0.25 \ell^2$$

$$r = \frac{1}{2} \ell$$

$$\text{semi circle} = \frac{1}{2} \pi r^2$$

$$\frac{1}{2} \pi \left(\frac{1}{2} \ell\right)^2$$

$$\frac{1}{2} \pi \cdot \frac{1}{4} \ell^2$$

$$\text{semi} = \frac{1}{8} \pi \ell^2$$

$$900 - \frac{1}{8} \pi \ell^2$$

$$\frac{1}{8} \pi \sqrt{900}^2$$

$$\frac{1}{8} \pi (900)$$

$$\frac{900}{8} \pi$$

$$900 - 112.5 \pi$$

$$8 \sqrt{900}$$

$$\frac{8}{10}$$

$$\frac{8}{20}$$

$$\frac{40}{40}$$

lawn area =

$$900 - \frac{112.5 \pi}{450}$$

$\text{m}^2$

Name:

Jordan Nguyen

Perm:

4170098

Math 34A Midterm 2

(100 pts total)

1. (6 pts) Use the log table provided with this exam to find

(a) (4 pts)  $10^{1.820}$

$$10^{1+0.820} \rightarrow 10^1 \cdot 10^{0.820} \rightarrow 10 \cdot 6.61$$

66.1

66.1

(b) (8 pts)  $\log(9.973/8.980)$

$\log 9.973 - \log 8.980$   
 $0.9987 - 0.9533$

$$\begin{array}{r} 0.9987 \\ - 0.9533 \\ \hline 0.0454 \end{array}$$

0.0454

(c) (12 pts)  $\log(\sqrt[5]{537})$

$$\frac{1}{5} \log 537 \rightarrow \frac{1}{5} \log(10^2 \cdot 5.37)$$

~~$\frac{1}{5}(2 + 0.73)$~~

$\frac{1}{5}(2 + 0.73)$

2.73  
—  
5

$\frac{2.73}{5}$

2 4 8 16 32 64 128 256 512 1024

$$256 + 256 = 512$$

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$\log 10^{2x-3} = \log 1024$$

$$10^{2x-3} = 2^{10}$$

$$(2x-3)\log 10 = \log 1024$$

$$(2x\log 10) - 3\log 10 = \log 1024$$

$$x = \frac{\log 1024 + 3\log 10}{2\log 10}$$

$$x =$$

$$\frac{\log 1024 + 3}{2}$$

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$$\frac{5-3}{-2+4} = \frac{2}{2} = 1$$

$$y = 1x + 7$$

$$3 = 1(-4) + b$$

$$3 = -4 + b$$

$$b = 7$$

$$y =$$

$$1x + 7$$

- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$$10 = \frac{3}{5}(4) + b$$

$$10 = \frac{12}{5} + b$$

$$10$$

$$\begin{aligned} 10 &= \cancel{\frac{12}{5}} + b \\ 50 &- \cancel{12} \\ 50 &- 12 \\ 38 &= b \end{aligned}$$

$$\frac{50}{5} - \frac{12}{5}$$

$$\frac{38}{5}$$

$$y =$$

$$\frac{3}{5}x + \frac{38}{5}$$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$x - 8 = 1 - \frac{1}{2}x$$

$$x + \frac{1}{2}x = 1 + 8$$

$$\frac{3}{2}x = 9 + \frac{2}{3}$$

$$x = \frac{18}{3} = 6$$

$$y = \frac{18}{3} - 8$$

$$\frac{18}{3} - \frac{24}{3}$$

$$y = -\frac{6}{3}$$

$$y = -2$$

$$(x, y) =$$

$$6, -2$$

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?

$$\frac{4}{20} = 20\%$$

$$\frac{16}{20} = \frac{4}{5}$$

~~20%  
5~~

$$10 \cdot \cancel{\left(\frac{1}{5}\right)} = \frac{10}{5} = 2$$

$$10 \cdot \frac{4}{5} = \frac{40}{5} = 8$$

$$8$$

L

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

- (a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$$f'(t) = 2t$$

$$\frac{2(1.2) - 2}{1.2 - 1} = \frac{2.4 - 2}{.2} = \frac{.4}{.2} = 2$$

|     |
|-----|
| 2   |
| m/s |

- (b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1 + h$  seconds.

$$\frac{2(1+h) - 2(1)}{1+h - 1} \rightarrow \frac{2+2h-2}{1+h-1} \rightarrow \frac{2h}{h} = 2$$

|     |
|-----|
| 2   |
| m/s |

- (c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

Plug it into the derivative.

6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ).

$$500(10+h - 10h)$$

$$500(10+h - 10h)$$

|                      |       |
|----------------------|-------|
| $\cancel{500(10+h)}$ | cards |
| $500(10+h - 10h)$    |       |

- (b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)$ ¢ each. Please simplify your answer (it should be in terms of  $h$ ).

|                   |   |
|-------------------|---|
| $500(10+h - 10h)$ | ¢ |
|-------------------|---|

7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2}$$

$$\left( \frac{4(4+1)}{2} \right) + \left( \frac{5(5+1)}{2} \right) + \left( \frac{6(6+1)}{2} \right)$$

$$\frac{20}{2} + \frac{30}{2} + \frac{42}{2}$$

$$10 + 15 + 21$$

$$46$$

46

8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

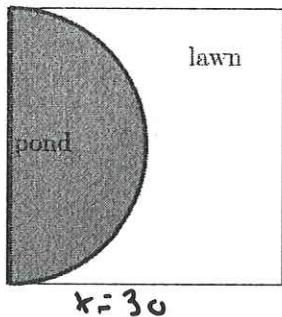
$$\cancel{48+24h+3h^2-48} \quad \cancel{h}$$

$$24+3h$$

$$24$$

24

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



$$\begin{aligned} x^2 &= 900 \\ x &= \sqrt{900} \\ &= \sqrt{100} \sqrt{9} \\ x &= 10 \cdot 3 \\ x &= 30 \end{aligned}$$

$$\begin{array}{r} 30 \\ \times 30 \\ \hline 900 \end{array}$$

$$\begin{array}{r} \pi 15^2 \\ \hline 2 \\ \begin{array}{r} 15 \\ \cdot 15 \\ \hline 75 \\ 15 \\ \hline 225 \end{array} \end{array}$$

$$\frac{\pi 225}{2}$$

$$900 - \frac{\pi 15^2}{2}$$

lawn area =

$$\boxed{900 - \frac{\pi 15^2}{2}} \text{ m}^2$$

Name: Ebony Negrete

Perm: 5705215

Math 34A Midterm 2

(100 pts total)

1. (6 pts) Use the log table provided with this exam to find

(a) (4 pts)  $10^{1.820}$

$10^1 + .820$

$10^1 + 4.401$

$10.401$

$10.401$

(b) (8 pts)  $\log(9.973/8.980)$

$\log(9.973) - \log(8.980)$

$.9987 - .9533$

$= .0454$

$0.0454$

(c) (12 pts)  $\log(\sqrt[5]{537})$

$\log(537^{1/5})$

$1/5 \log(537)$

$1/5 \log(10^2 \cdot 5.37)$

$1/5 (2 + \log(5.37))$

$1/5 (2 + .7300)$

$1/5 (2.7300)$

$2.7300/5$

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$10^{2x-3} = 2^{10}$$

$$\log(10^{2x-3}) = \log(2^{10})$$

$$(2x-3)\log(10) = 10\log(2)$$

$$2x\log(10) - 3\log(10) = 10\log(2)$$

$$2x\log(10) = 10\log(2) + 3\log(10)$$

$$x = \frac{10\log(2) + 3\log(10)}{2\log(10)}$$

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$(-4, 3) (-2, 5)$

$$\frac{5-3}{-2-(-4)} = \frac{2}{-2} = -1$$

$$y = -x + b$$

$$y = x + 7$$

$$3 = (-4) + b$$

$$7 = b$$

$$y = (-2) + 7$$

$$y = 5 \checkmark$$

$$y = (-4) + 7$$

$$y = 3 \checkmark$$

$$y =$$

$$x + 7$$

- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$$y = \frac{3}{5}x + b$$

$$y = \frac{3}{5}(4) + \frac{38}{5}$$

$$10 = \frac{3}{5}(4) + b$$

$$y = \frac{12}{5} + \frac{38}{5}$$

$$10 = \frac{12}{5} + b$$

$$y = \frac{50}{5} \quad y = 10 \checkmark$$

$$10 - \frac{12}{5} = b$$

$$y =$$

$$\frac{3}{5}x + \frac{38}{5}$$

$$\frac{50}{5} - \frac{12}{5} = b$$

$$\frac{38}{5} = b$$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$x - 8 = 1 - \frac{1}{2}x$$

$$y = (4) - 8$$

$$y = -2$$

$$x + \frac{1}{2}x = 9$$

$$\frac{3}{2}x = 9$$

$$\frac{3x}{3} = \frac{18}{3}$$

$$x = 6$$

$$(x, y) =$$

(6, -2)

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?

Initially: can A = 8 lit red

Pour half:

can B = 16 lit blue

can A = 4 lit red

can B = 16 lit blue; 4 lit red

$\underbrace{\hspace{10em}}$

20 lit

after mixing:

can A: 4 lit red + 1/2 can B

$$\frac{16}{20} = \frac{4}{5} = 80\%$$

$$\frac{4}{20} = \frac{1}{5} = 20\%$$

$$16 \times .5 = 8$$

8 L

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

(a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$$f(1) = 1^2 = 1 \quad f(1.2) = 1.2^2 = 1.44$$

$$\begin{array}{r} 1.2 \\ \times 1.2 \\ \hline 24 \\ +120 \\ \hline 1.44 \end{array}$$

$$\frac{1.44 - 1}{1.2 - 1} = \frac{.44}{.2} = .22$$

.22 m/s

(b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1+h$  seconds.

$$f(1) = 1^2 = 1 \quad f(1+h) = (1+h)^2 = (1+h)(1+h) = 1+h+h+h^2 = h^2+2h+1$$

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

h+2 m/s

(c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

we would have to find the derivative using  $f(x+h) - f(x)/h$ . Using the derivative will help us find the instantaneous speed

6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ).

$$\begin{array}{l} 10\text{¢} = 500 \text{ cards} \\ 11\text{¢} = 490 \text{ cards} \\ 12\text{¢} = 480 \text{ cards} \end{array} \quad \begin{array}{l} \leftarrow \\ \uparrow 10 \downarrow 10 \text{ cards} \end{array} \quad 500 = 10h + 500$$

$$\frac{500 - 490}{11 - 10} = \frac{10}{1} \quad 10h$$

$$500 - 10h$$

$500 - 10h$  cards

- (b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)$ ¢ each. Please simplify your answer (it should be in terms of  $h$ ).

$$500 - 10(10 + h)$$

$$500 - 100 - 10h$$

$$400 - 10h$$

$400 - 10h$  ¢

7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2}$$

$$\frac{4(4+1)}{2} + \frac{5(5+1)}{2} + \frac{6(6+1)}{2}$$

46

$$\frac{20}{2} + \frac{30}{2} + \frac{42}{2}$$

$$10 + 15 + 21$$

$$= 46$$

8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

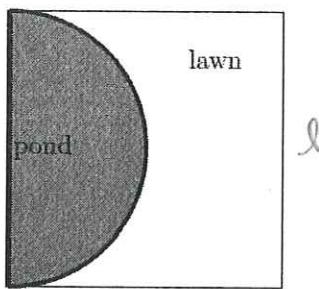
$$\frac{3h^2+24h}{h} \quad \frac{h(3h+24)}{h}$$

$$\lim_{h \rightarrow 0} \frac{3h+24}{0+24} = \frac{3(0)+24}{0+24} = 24$$

24

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.

$$\begin{aligned} r &= \ell/2 \\ r &= 30/2 \\ r &= 15 \end{aligned}$$



$$A = \ell^2$$

$$\sqrt{900} = \sqrt{\ell^2}$$

$$30 = \ell$$

$$A = \pi r^2$$

$$A = \pi (15)^2$$

$$A = 325\pi/2$$

$$\begin{array}{r} 215 \\ \times 15 \\ \hline 1075 \\ +215 \\ \hline 325 \end{array}$$

$$A(\text{lawn}) = 900 - 325\pi/2$$

lawn area = 
$$\boxed{900 - \frac{325\pi}{2} \text{ m}^2}$$

Name: Jasmine Jackson

Perm: 4669892

**Math 34A Midterm 2**

*(100 pts total)*

1. (6 pts) Use the log table provided with this exam to find

(a) (4 pts)  $10^{1.820}$

$$10^3 = 1000$$

$$10^1 = 10$$

$$10^0 = 1$$

16.61

(b) (8 pts)  $\log(9.973/8.980)$

$$\log(9.973) - \log(8.980)$$

$$\log(10) + \log(0.9973) - \log(10) + \log(0.980)$$

$$\begin{aligned} &= (1 + 4.97) - (1 + 4.98) \\ &\approx 15.941 - 16.001 \\ &\approx -0.059 \end{aligned}$$

-0.059

(c) (12 pts)  $\log(\sqrt[5]{537})$

$$\log(537)$$

$$= \frac{1}{5} \log(537)$$

$$= \frac{\log(537)}{5}$$

$$= \frac{3 + 3.441}{5}$$

$$= \frac{6.441}{5}$$

$\frac{6.441}{5} \approx 1.288$

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$10^{2x-3} = 2^{10}$$

$$(2x-3) \log(10) = 10 \log(2)$$

$$2x-3 = 10 \log(2)$$

$$2x = 10 \log(2) + 3$$

$$x = \frac{10 \log(2) + 3}{2}$$

$$x = \boxed{3 \text{ or } 3,005}$$

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$$\begin{aligned} (-4, 3) & \rightarrow \frac{5-3}{-2+4} = \frac{2}{2} = 1 \\ (-2, 5) & \end{aligned}$$

$$3 = 1(-4) + b$$

$$3 = -4 + b$$

$$y = x + 7$$

$$y = \boxed{x + 7}$$

- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$$(4, 10) \rightarrow 10 = \frac{3}{5}(4) + b$$

$$10 = \frac{12}{5} + b$$

$$10 - \frac{12}{5} = b$$

$$\frac{50-12}{5} = b$$

$$\frac{38}{5} = b$$

$$y =$$

$$\boxed{\frac{38}{5}}$$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$(y-8 = 1 - \frac{1}{2}x)^2 \quad y = 6 - x$$

$$2y - 16 = 2 - x \quad + 2y = 6$$

$$3x - 16 = 2$$

$$3x = 18$$

$$x = 6$$

$$(x, y) = (6, 2)$$

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?

|          |          |
|----------|----------|
| <u>A</u> | <u>B</u> |
| 8 R      | 16 B     |
| -4 R     | 12 B     |
| +10 R+B  | 14 B     |
| 14 R     | 14 B     |

Final state:  $\frac{14}{2} R + \frac{14}{2} B$

$$\boxed{\hspace{1cm}} \text{L}$$

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

- (a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$$f(1) = 1^2 = 1 \quad \frac{11.44 - 1}{1.2 - 1} = \frac{13.44}{0.2}$$

$$\begin{array}{r} f(1.2) = 1.2^2 \\ \phantom{f(1.2)}= 1.44 \\ \hline 1.2 \\ \hline 24 \\ 120 \\ \hline 144 \end{array}$$

$$\frac{13.44}{0.2} \cdot \frac{12}{10} = \frac{134.4}{2} = 67$$

\_\_\_\_\_

$m/s$

$67$

- (b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1 + h$  seconds.

$$\begin{aligned} f(1) &= 1^2 = 1 & \frac{h^2 - 2h + 1 - 1}{1+h-1} &= \frac{h^2 - 2h}{h} \\ f(1+h) &= (1+h)(1+h) & &= \frac{h^2 - 2h}{h} \\ &= 1 + h + h + h^2 & &= h^2 - 2h \\ &= 1 + 2h + h^2 & & \end{aligned}$$

$\frac{h^2 - 2h}{h}$

$$\begin{aligned} \frac{(h^2 + 2h + 1) - 1}{(1+h) - 1} &= \frac{h^2 + 2h}{h} \\ &= \frac{h^2 + 2h}{h} \end{aligned}$$

$\frac{h^2 - 2h}{h}$  or  $(h^2 - 2)$

$m/s$

- (c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

I would find the average speed of the balloon between a small interval such as 1 second and 0.1 seconds.

6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ). *(10 + h) cards*

10¢ = 500 cards  
10¢ + 1¢ = 490 cards  
10¢ + 2¢ = 480 cards

$$\begin{aligned} \text{Price} &= 10 + h \\ \text{Cards} &= 500 - 10h \end{aligned}$$

$$\begin{aligned} 10 + h &= 300 \\ h &= 200 \\ \text{Cards} &= 500 - 200 \\ &= 300 \end{aligned}$$

|  |     |       |
|--|-----|-------|
|  | 300 | cards |
|--|-----|-------|

- (b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)$ ¢ each. Please simplify your answer (it should be in terms of  $h$ ). *Price = 10 + h*

$$\begin{aligned} \text{Price} &= 10 + h \\ \text{Cards} &= 500 - 10h \\ \text{Revenue} &= (\text{Price})(\text{Cards}) \\ &= (10 + h)(500 - 10h) \\ &= 5000 + 400h - 100h^2 \\ &= 5000 + 400h - 100h^2 \end{aligned}$$

|         |   |
|---------|---|
| 6200.00 | ¢ |
|---------|---|

7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2}$$

$$\frac{4(4+1)}{2} + \frac{5(5+1)}{2} + \frac{6(6+1)}{2}$$

$$10 + 15 + 21$$

$$25 + 21$$

$$46$$

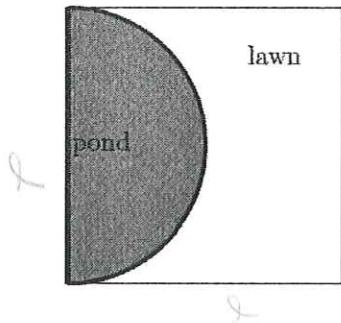
|    |
|----|
| 46 |
|----|

8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

$$\frac{48+24h+3h^2-48}{h} = \frac{24h+3h^2}{h} = 24+3h^2$$

|    |
|----|
| 24 |
|----|

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



$$A = 900 \text{ m}^2 \quad \sqrt{900} = 30 \text{ m}$$

Area of pond

$$A = \frac{1}{2}\ell^2$$

$$\text{Area of pond} = \frac{1}{2}(30)^2 = 450 \text{ m}^2$$

$$\text{Area of lawn} = 900 - 450 = 450 \text{ m}^2$$

Area of lawn

$$450 = 15 \cdot 30$$

Area of garden

$$900 = 30 \cdot 30$$

$$15 \cdot 2 = 30$$

$$15 \cdot 1 = 15$$

lawn area = 144  $\text{m}^2$

Name: Christian Perez

Perm: 7987662

**Math 34A Midterm 2**

*(100 pts total)*

1. (6 pts) Use the log table provided with this exam to find

(a) (4 pts)  $10^{1.820}$

$$\begin{array}{r} 10^1 \cdot 10^{.820} \\ 10 \cdot 6.61 \\ \hline 6.610 \end{array}$$

66.10

(b) (8 pts)  $\log(9.973/8.980)$

$$\begin{array}{r} \log(9.973) - \log(8.980) \\ 0.9987 - 0.9533 \\ \hline .0454 \end{array}$$

.0454

(c) (12 pts)  $\log(\sqrt[5]{537})$

$$\begin{array}{l} \log(537^{1/5}) = \frac{1}{5} \log(537) \\ (\frac{1}{5}) \log(537) + \log(10^2) \end{array}$$

$$\begin{array}{r} 0.730 + 2 \quad \begin{array}{r} 546 \\ 5 \overline{)2.730} \\ -25 \\ \hline 23 \\ -20 \\ \hline 3 \end{array} \\ \hline \end{array}$$

0.546

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$10^{2x-3} = 2^{10}$$

$$\log(10^{2x-3}) = \log(2^{10})$$

$$2x-3 = 10$$

$$2x = 13$$

$$x = \frac{13}{2}$$

$$\begin{array}{r} 3.005 \\ 2 \sqrt{6.010} \\ \downarrow 6 \\ \downarrow 00 \\ -0 \\ \hline 6 \\ -0 \\ \hline 10 \end{array}$$

$$(2x-3)\log(10) = 10\log(2)$$

$$(2x-3)1 = 10 \cdot 0.301$$

$$2x-3 = 3.01$$

$$2x = \underline{\underline{6.01}}$$

$$x =$$

$$3.005$$

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$$(-4, 3)(-2, 5) \quad m = \frac{5-3}{-2-(-4)} = \frac{2}{2} = 1 \quad y = x + b \quad y = x + 7$$

$$\frac{y_2 - y_1}{x_2 - x_1} \rightarrow \frac{5-3}{-2-(-4)} \rightarrow \frac{2}{2} \rightarrow \frac{2}{2} + 4 \quad 3 = -4 + b$$

$$-7 = b$$

$$y =$$

$$x + 7$$

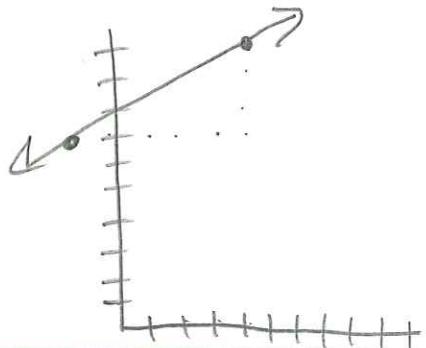
- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$$y = \frac{3}{5}x + ? \quad y - y_1 = \frac{3}{5}(x - x_1)$$

$$10 = \frac{3}{5}(4) + b \quad y - 10 = \frac{3}{5}(x - 4)$$

$$10 = \frac{12}{5} + b$$

$$\frac{50}{5} - \frac{12}{5} = b$$



$$y = \frac{3}{5}x + \frac{38}{5}$$

5

$$\frac{38}{5} = b$$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$\begin{aligned}y &= x - 8 & -\frac{1}{2}x + 1 &= x - 8 \\y &= -\frac{1}{2}x + 1 & 9 - \frac{1}{2}x &= x \\&& 9 - 0.5x &= x \\&& +0.5x &+0.5x \\&\frac{9}{1.5} &= \frac{1.5x}{1.5} & x = 6 \\&& \cancel{1.5} & \\&& \cancel{x} & x = 6 \\&& 6 & \\y &= x - 8 & -2 &= 6 - 8 \\& & -2 &= -2\end{aligned}$$

$$y = -\frac{1}{2}x + 1$$

$$-2 = -\frac{6}{2} + 1$$

$$-2 = -3 + 1$$

$$-2 = -2$$

$$(x, y) =$$

$$(6, -2)$$

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?

$$\text{Can A} = 8 \text{ L red}$$

$$\text{Can A} = 4 \text{ L red}$$

$$\rightarrow \text{Can A} = 4 \text{ L red} + 2 \text{ L red} + 8 \text{ L blue}$$

$$\text{Can B} = 16 \text{ L blue}$$

$$\rightarrow \text{Can B} = 16 \text{ L blue}, 4 \text{ L red}$$

$$\text{Can B} = 8 \text{ L blue}, 2 \text{ L red}$$

$$8 \text{ L} \quad 2 \text{ L}$$

$$\begin{matrix} 26 \\ 8, 2 \end{matrix} \rightarrow 10$$

$$\boxed{\phantom{000}} \text{ L}$$

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

- (a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$$\frac{(1.2)^2 - (1)^2}{1.2 - 1} = \frac{1.44 - 1}{.2} = \frac{.44}{.2} \rightarrow .22$$

$\begin{array}{r} 1.2 \\ \times 1.2 \\ \hline 24 \\ 120 \\ \hline 1.44 \end{array}$

|     |       |
|-----|-------|
| .22 | $m/s$ |
|-----|-------|

- (b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1+h$  seconds.

$$\frac{(1+h)^2 - (1)^2}{(1+h) - 1} = \frac{(1+h)(1+h) - 1}{1+h+h+h^2} = \frac{\cancel{1+2h+h^2}-\cancel{1}}{h} = \frac{2h+h^2}{h} = \cancel{h}(2+h)$$

|       |       |
|-------|-------|
| $2+h$ | $m/s$ |
|-------|-------|

- (c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

First we would find the derivative of the function  $f(t) = t^2$ , which would be  $2t$  (or  $2t$ ). Then we would plug the given time (1 second) into  $2t$ . It would be 2.

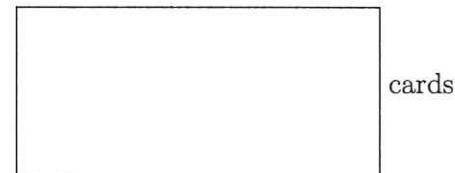
6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ).

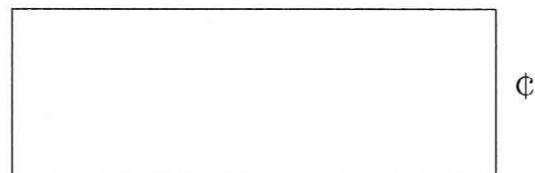
10¢ per card, 500 cards       $(10+h)$  = price

$h$  = each & decrease by 10 cards.

$$500 = c(10+h)$$



- (b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)$ ¢ each. Please simplify your answer (it should be in terms of  $h$ ).



7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2}$$

$$\left( \frac{4(4+1)}{2} \right) + \left( \frac{5(5+1)}{2} \right) + \left( \frac{6(6+1)}{2} \right)$$

46

$$\frac{20}{2} + \frac{30}{2} + \frac{42}{2} = 10 + 15 + 21$$

46

$$\begin{array}{r} 21 \\ + 15 \\ \hline 36 \\ + 10 \\ \hline 46 \end{array}$$

8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

$$\frac{24h+3h^2}{h}$$

$$\cancel{h}(24+3\cancel{h})$$

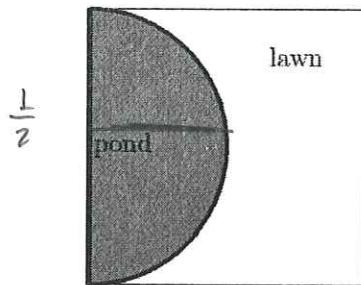
$$44+3\cancel{h}$$

$$\downarrow 3 \cdot 0$$

44

44

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



Find  $\square$ , subtract  $\square$  from  $\square$ .

$$A = \frac{\pi l^2}{2} - 2l^2 \quad \pi$$

$\text{lawn}$   $l \cdot l$



$$l = 2r$$

$$r = \frac{l}{2}$$

$$\sqrt{900} = \sqrt{4l^2}$$

$$\sqrt{100} \cdot \sqrt{9} = 10 \cdot 3$$

$$\frac{30}{2} = \frac{8l}{4}$$

$$15 = l$$

$$A = 2l^2 - \frac{\pi(\frac{l}{2})^2}{2}$$

$$A = 2(15)^2$$

$$A = 2(225) - \frac{\pi\left(\frac{15}{2}\right)^2}{2}$$

$$A = 550 - \frac{\pi(7.5)^2}{2}$$

$$\begin{array}{r} 2 \\ 15 \\ \times 15 \\ \hline 75 \\ 150 \\ \hline 225 \end{array}$$

$$A = 550 - \frac{56.25\pi}{2}$$

$$\begin{array}{r} 225 \\ 23 \\ 7.5 \\ \times 7.5 \\ \hline 375 \end{array}$$

$$\begin{array}{r} 5250 \\ \hline 56.25 \end{array}$$

lawn area =

|                            |              |
|----------------------------|--------------|
| $550 - \frac{56.25\pi}{2}$ | $\text{m}^2$ |
|----------------------------|--------------|

+

Name:

Yesenia fil

Perm:

5005103

Math 34A Midterm 2

(100 pts total)

$$\begin{array}{r} 1.820 \\ \times 10 \\ \hline 18.20 \end{array}$$

1. (6 pts) Use the log table provided with this exam to find

(a) (4 pts)  $10^{1.820}$

$$\begin{array}{r} 10 \\ \times 1.820 \\ \hline \end{array}$$

$$1.820 \text{ Log}[10]$$

$$1.820 \times 1$$

$$\begin{array}{r} 18.20 \\ 10 - 18.20 = 8.20 \\ \times 10 \\ \hline 82.0 \end{array}$$

$$\log(1.820) = 0.2601$$

$$\log 1.820 = 0.2601$$

$$10^{\log[1.820]}$$

$$\log(1.820) = 0.2601$$

$$10^{0.2601}$$

$10^2 = 100$   
has to be  
between  
 $10 - 100$

$$82.0$$

(b) (8 pts)  $\log(9.973/8.980)$

$$\begin{array}{r} 0.9987 \\ - 0.9538 \\ \hline 0.0449 \end{array}$$

$$\log\left(\frac{9.973}{8.980}\right)$$

$$\log(9.973) - \log(8.980)$$

$$0.9987 - 0.9538$$

$$0.0449$$

(c) (12 pts)  $\log(\sqrt[5]{537})$

$$\frac{1}{5} \log(537)$$

$$\frac{1}{5} (\log(5.37) + \log(100))$$

$$(0.7300 + 2)$$

$$\frac{1}{5} (2.7300)$$

$$\frac{1}{5} \times \frac{2.7300}{1} = \frac{2.7300}{5}$$

$$\begin{array}{r} 5 \\ | \\ 13 \\ 5 \end{array}$$

$$0.546$$

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$10^{2x-3} = 2^{10}$$

$$\begin{array}{rcl} 10 \times \log(2) & & \\ 10(0.3010) & & \frac{3.005}{216.010} \\ \cancel{10} \cancel{(0.3010)} & = 3.010 & -6 \\ & & \underline{-} \\ & & = .810 \\ \cancel{2x} = \cancel{0.010} & & \cancel{= \cancel{.810}} \\ \frac{2x}{2} & & \\ x = & & 3.005 \end{array}$$

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$$\begin{array}{ccc} 5-3=2 & (-4, 3) & \frac{2}{2}=1 \\ -2+(-4)=2 & (-2, 5) & \\ y=1(x+4)+3 & y=1(x+2)+5 & x+7 \\ & x+2+5 & \end{array}$$

$$y = x + 7$$

- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$$\begin{array}{c} \frac{3}{5}(x-4)+10 \\ \frac{3}{5}x-\frac{12}{5}+\frac{50}{5} \\ \frac{3}{5}x+\frac{38}{5} \end{array}$$

$$\begin{array}{r} 4 \\ 50 \\ -12 \\ \hline 38 \end{array}$$

$$y = \frac{3}{5}x + \frac{38}{5}$$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$y = x - 8$$

$$y = -\frac{1}{2}x + 1$$

$$x - 8 = -\frac{1}{2}x + 1$$

$$\cancel{x} - \cancel{x} - 8 = -\frac{1}{2}x + 1$$

$$-9 = -\frac{1}{2}x$$

$$-\frac{18}{2} = -\frac{1}{2}x$$

$$x = 18$$

$$y = 1 - \frac{1}{2}(18)$$

$$y = 1 - 9$$

$$y = -8$$

$$(x, y) = (18, -8)$$

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?

$$A = 8 \text{ L Red}$$

$$B = 16 \text{ L Blue}$$

$$\frac{4 \text{ L Red} + 16 \text{ L Blue}}{2} = \frac{2 \text{ L Red} + 8 \text{ L Blue}}{2} + \frac{4 \text{ L Red}}{2}$$

$$B \quad L$$

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

- (a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$f(t) = t^2$  meters of distance from child  
 $t = \text{seconds}$

$$\begin{array}{r} 1.2 \\ \times 1.2 \\ \hline 24 \\ 120 \\ \hline 1.44 \end{array}$$

$f(t) = 1 \text{ meter in 1 sec}$

$(1, 1)$

$(1.2, 1.44)$

second meters

$$\begin{array}{r} 2.2 \\ \times 1.2 \\ \hline 44 \end{array}$$

$$\begin{array}{r} 1.44 - 1 \\ = .44 \\ \hline 1.2 - 1 \\ = .2 \end{array} \quad \begin{array}{r} 2.2 \\ \hline 1.44 \end{array}$$

1 second to 1.2 seconds

avg speed

$$\text{Speed} = \frac{m}{sec}$$

$$\boxed{2.2} \quad m/s$$

- (b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1 + h$  seconds.

$$\frac{\text{avg speed}}{t [(1+h)-1]} = h$$

$$\begin{array}{l} (1+h)^2 - 1^2 \\ \hline 1+2h+h^2 \end{array}$$

$$= \frac{2h+h^2}{h}$$

$$\cancel{h(1+h)} \quad \cancel{h}$$

$$\boxed{(2h)} \quad m/s$$

- (c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

We would take the derivative of the  $f(t)$  function, then plug 1 second into  $f(t)$ .

6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ).

$$\text{if } = .10x, \text{Sales} = 500x$$

$$\text{but } x > .10, (x - .10) = 500 - 10x$$

$$\begin{array}{r} \underline{04} \\ 11 \overline{)490} \\ \underline{-4} \\ 90 \\ \underline{-88} \\ 2 \end{array} \quad \text{if } (10+h)t = 500 - 10h$$

$$10th = 500 - 10h$$

$$\underline{+10h} \qquad \qquad \qquad \underline{+10h}$$

$$10 + 11h = 500$$

$$\underline{-10} \qquad \qquad \qquad \underline{10}$$

$$11 \overline{)490}$$

500 - 10(h) cards

- (b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)\text{¢}$  each. Please simplify your answer (it should be in terms of  $h$ ). ~~Part 1~~ Part 2

$$\begin{array}{rcl} 10 + h & = & 500 - 16h \\ \underline{-10 - 10h} & & \underline{-10 - 10h} \\ 11h & = & 490 \end{array}$$

$$\begin{array}{r}
 \underline{0} \ 4 \ 4.5 \ 4 \ 5 \\
 11 \overline{)4} \ 9 \ 0.0 \\
 \underline{-} \ 4 \ 4 \\
 \underline{\underline{5} \ 0} \\
 - \ 4 \ 4 \\
 \underline{\underline{0}}
 \end{array}$$

$$\begin{array}{r} \text{55} \\ \text{44} \\ \hline \text{60} \end{array} \quad \begin{array}{l} \text{cents} \\ \text{2} \end{array}$$

→ \$44.55 \times 100 = 4455 \text{ cent}

4455

7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2}$$

|                            |                            |                            |
|----------------------------|----------------------------|----------------------------|
| 4                          | 5                          | 6                          |
| <u><math>4(4+1)</math></u> | <u><math>5(5+1)</math></u> | <u><math>6(6+1)</math></u> |
| <u>2</u>                   | <u>2</u>                   | <u>2</u>                   |
| <u><math>4(5)</math></u>   | <u><math>5(6)</math></u>   | <u><math>6(7)</math></u>   |
| <u>2</u>                   | <u>2</u>                   | <u>2</u>                   |

$$\begin{array}{r} 10 \\ + 15 \\ + 15 \\ \hline 30 \\ + 10 \\ \hline 40 \end{array}$$

40

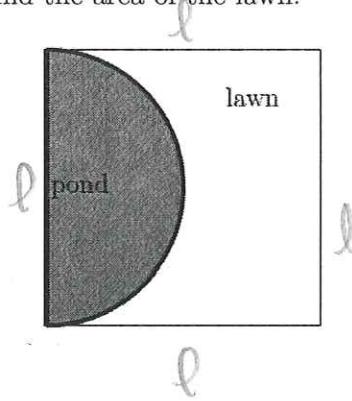
8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h} = \frac{24h+3h^2}{h} \cancel{\times} \frac{h(24+3h)}{h}$

$$24+3h \rightarrow 0$$

24

24

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



$$R = \frac{\ell}{2} \quad \ell = \sqrt{900}$$

$$\frac{\sqrt{900}}{2} = R$$

$$\text{Area Pond} = \pi R^2 = \pi \left(\frac{\sqrt{900}}{2}\right)^2$$

$$\text{Area Pond} = 225\pi$$

$$\pi \left(\frac{900}{4}\right)$$

$$A_{\text{Lawn}} = A_{\text{Square}} - A_{\text{Pond}}$$

$$\text{Area Lawn} = 900 - 225\pi$$

$$\frac{\sqrt{900}}{2} \times \frac{\sqrt{900}}{2}$$

$$= \frac{900}{4}$$

$$\begin{array}{r} 225 \\ 4 \overline{)900} \\ -8 \\ \hline 100 \end{array}$$

lawn area =

$$900 - 225\pi$$

$\text{m}^2$

Name: Rhyanne Apostol

Perm: 91193664

Math 34A Midterm 2

(100 pts total)

1. (6 pts) Use the log table provided with this exam to find

(a) (4 pts)  $10^{1.820}$

$$\log_{10} = 1.820$$

$$\log_{10} =$$

$$.2601$$

(b) (8 pts)  $\log(9.973/8.980)$

$$\log_{10} 9.973$$

$$\log_{10} 8.980$$

$$10^x =$$

$$\begin{array}{r} 9.973 \\ - 8.980 \\ \hline .993 \end{array}$$

$$.0455495$$

(c) (12 pts)  $\log(\sqrt[5]{537})$

$$\log(\sqrt[5]{537})$$

$$.7931$$

$$10^x = \sqrt[5]{537}$$

$$\sqrt[5]{537} =$$

$$.645493$$

$$\log_{10} 537$$

$$\boxed{.537}$$



3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$y = x - 8$$

$$y = 1 - \frac{1}{2}x$$

$$1 - \frac{1}{2}(x)$$

$$-3$$

$$-2$$

$$x - 8 = 1 - \frac{1}{2}x$$

$$x = 9 - \frac{1}{2}x$$

$$x + \frac{1}{2}x = 9$$

$$2x + \frac{x}{2} = 9$$

$$5x = 18$$

$$x = 6$$

$$(x, y) = (6, -2)$$

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?

$$A = \frac{8R}{2}$$

$$B = 16B$$

$$16B + \frac{8R}{2}$$

$$\frac{16B + 8R}{2} + 4R$$

$$8B + 2R + 4R$$

$$8$$

L

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

- (a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$$D = \frac{t^2}{S}$$

$$\frac{1^2 - 1.2^2}{1.4}$$

$$\frac{1 + 1.2}{S} \cdot 2$$

$$\frac{1.2^2 - 1^2}{0.2}$$

$$\log_{1.2} 2$$

|      |
|------|
| 1.2  |
| 1.2  |
| 2.4  |
| 12.0 |
| 14.4 |

|   |
|---|
| 2 |
|---|

m/s

- (b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1 + h$  seconds.

$$1 - (1+h)$$

$$h = t$$

$$h^2 = d$$

$$\frac{h^2 - 1^2}{h} \cdot \frac{1}{h}$$

|     |
|-----|
| $h$ |
|-----|

m/s

- (c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

plug in 1 to  $t^2$  to find distance and  
then divide it by 1

6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ).

$$(500 - 10h)(10 + h)$$

$$500(10 + h)$$

$$5000 + 500h - 100h - 10h^2$$

$$\frac{500}{10}(10 + h)$$

$$5000 + 400h - 10h^2$$

$$(500 - 10h)(10 + h)$$

|             |       |
|-------------|-------|
| $500 - 10h$ | cards |
|-------------|-------|

- (b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)$ ¢ each. Please simplify your answer (it should be in terms of  $h$ ).

|                       |   |
|-----------------------|---|
| $-10h^2 + 400h + 500$ | ¢ |
|-----------------------|---|

7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2}$$

$$\frac{4(4+1)}{2} + \frac{5(5+1)}{2} + \frac{6(6+1)}{2}$$

46

$$\frac{4(5)}{2} + \frac{5(6)}{2} + \frac{6(7)}{2}$$

$$\frac{20}{2} + \frac{30}{2} + \frac{42}{2}$$

$$10 + 15 + 21 = \\ 25 + 21 =$$

46

8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

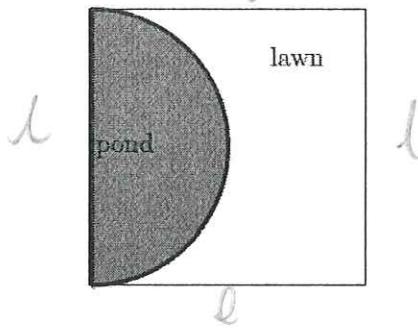
$$48+24(0)+3(0)^2-48$$

0 0

$$48-48=0$$

8

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



$$\ell^2 = 900 \text{ m}^2$$

$$\sqrt{900}$$

$$\sqrt{100 \cdot 9}$$

$$\frac{1}{2} \pi r^2$$

$$103 \cdot 30$$

$$30 = l$$

$$\frac{1}{2} \pi (30)^2$$

$$900 - \frac{\pi(900)}{2}$$

$$\frac{\pi(400)}{2}$$

$$450$$

$$\frac{\pi}{2} \cdot 450$$

lawn area =

$$900 - \left( \frac{\pi 900}{2} \right) \text{ m}^2$$

Name: Andrew Liu

Perm: U3H8439

Math 34A Midterm 2

(100 pts total)

1. (6 pts) Use the log table provided with this exam to find

(a) (4 pts)  $10^{1.820}$

$$10^1 \cdot 10^{0.820}$$

$$10 \cdot 6.61$$

$$= 66.1$$

$$\boxed{66.1}$$

(b) (8 pts)  $\log(9.973/8.980)$

$$\log(9.973) - \log(8.980)$$

$$[\log(9) + \log(0.973)] - [\log(8) + \log(0.980)]$$

$$[0.9542 +$$

$$\downarrow \\ \log(9.973) + \log(10^{-1}) \\ 0.9542 + 0.1$$

$$0.9031 + [\log(0.8) + \log(10^{-1})]$$

$$9.881$$

$$[0.9542 + 9.881] - [0.9031 + 0.912]$$

(c) (12 pts)  $\log(\sqrt[5]{537})$

$$\log(537^{\frac{1}{5}})$$

$$\frac{1}{5} \log(537)$$

$$\frac{1}{5} \log(5.37 \times 10^2)$$

$$\frac{1}{5} [\log(5.37) + \log(100)]$$

$$\frac{1}{5} [0.73 + 2]$$

$$\frac{2.73}{5}$$

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$10^{2x-3} = 2^{10}$$

$$\begin{array}{r} 0.05 \\ \times 2 \\ \hline 0.10 \end{array}$$

$$\begin{array}{r} 0.05 \\ \times 2 \\ \hline 0.10 \end{array}$$

$$\log(10^{2x-3}) = \log(2^{10})$$

$$2x-3(\log(10)) = 10(\log(2))$$

$$2x-3(1) = 10(0.3010)$$

$$2x-3 = 3.010$$

$$2x = 0.10$$

$$x = \frac{0.1}{2}$$

$$x = \frac{0.1}{2} = 0.05$$

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$$(-4, 3) (-2, 5)$$

$$y = x + b$$

$$3 = -4 + b$$

$$7 = b$$

$$\text{if } \frac{5-3}{(-2)-(-4)} = \frac{2}{2} = 1$$

$$y = x + 7$$

- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$$y = \frac{3}{5}x + b$$

$$(4, 10)$$

$$10 = \frac{3}{5}(4) + b$$

$$10 = \frac{12}{5} + b$$

$$y = \frac{3}{5}x + \frac{38}{5}$$

$$\left(\frac{5}{5}\right)10 - \frac{12}{5} = b$$

$$\frac{50}{5} - \frac{12}{5} = b$$

$$\frac{38}{5} = b$$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$y = x - 8$$

$$y = 1 - \frac{1}{2}x$$

$$y = x - 8$$

$$1 - \frac{1}{2}x = x - 8$$

$$y = 6 - 8$$

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

$$y = -2$$

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

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

$$1 = \frac{3x}{2}$$

$$18 = 3x$$

$$(x, y) =$$

$$6 = x$$

$$(6, -2)$$

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?

1. Can A: 8L red

Can B: 16L Blue



2. B: 4L red + 16L Blue      A: 4L red



3. A: 2L red + 8L Blue + 4L red

B: 2L red + 8L Blue

A: 6L red + 8L Blue

8

L

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

- (a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$$\begin{array}{r} 1.2 \\ - 1.0 \\ \hline 0.2 \\ 1.44 \\ - 1.00 \\ \hline 0.44 \end{array}$$

$$f(t) = t^2$$

$$\frac{(-2)^2 + (1)^2}{1.2 - 1} = \frac{1.44 - 1}{0.2} = \frac{0.44}{0.2} = 2.2$$

144

$$\begin{array}{r} 12 \\ 12 \\ \hline 0 \end{array}$$

$$\boxed{2.2} \text{ m/s}$$

- (b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1+h$  seconds.

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

$$(1+h)(1+h)$$

$$1+h+h+h^2$$

$$\boxed{\frac{h^2 + 2h + 2}{h}} \text{ m/s}$$

- (c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

find the limit as  $h \rightarrow 0$  of the above equation to find instantaneous speed

6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ).

$$(10\text{¢} \times)(500)$$

Let  $h$  be # & increased

$$\text{Profit} = (10+h)(500 - 10h)$$

$$500 - 10h$$

cards

- (b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)$ ¢ each. Please simplify your answer (it should be in terms of  $h$ ).

$$\text{Profit} = (10+h)(500 - 10h)$$

$$= 5000 - 100h + 500h - 10h^2$$

$$= 5000 + 400h - 10h^2$$

$$-10h^2 + 400h + 5000$$

¢

7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2}$$

$$\frac{4(4+1)}{2} + \frac{5(5+1)}{2} + \frac{6(6+1)}{2}$$

46

$$10 + 15 + 21$$

$$15 + 21$$

46

8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

$$\frac{24h+3h^2}{h}$$

$$3h^2 + 24h + 48$$

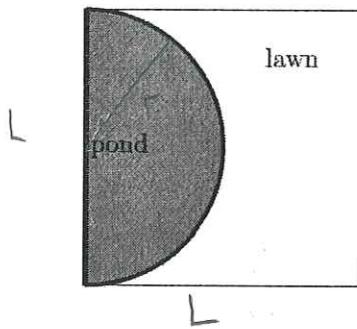
$$\cancel{3x} \cancel{+12} \\ \times \cancel{4}$$

$$\frac{x(24+3x)}{x} = 24 + 3x$$

$$\frac{(3x+12)(x+4)-48}{x}$$

24

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



$$A \text{ of Square} = 900 \text{ m}^2$$

$$A \text{ of Square} - A \text{ of pond} = A \text{ of lawn.}$$

$$A \text{ of semi circle} = \frac{1}{2}\pi r^2$$

$$r = \frac{1}{2}L = \frac{\sqrt{900}}{2}$$

$$A \text{ of Square} = L^2$$

$$900 = L^2$$

$$\sqrt{900} = L$$

$$900 - \frac{1}{2}\pi \left(\frac{\sqrt{900}}{2}\right)^2 = \text{Area of lawn}$$

$$900 - \frac{1}{2}\pi \left(\frac{900}{4}\right) =$$

$$900 - \frac{225\pi}{2} =$$

$$\begin{array}{r} 225 \\ 4 \overline{)900} \\ -8 \\ \hline 10 \\ -8 \\ \hline 20 \end{array}$$

lawn area =

$$900 - \frac{225\pi}{2} \text{ m}^2$$

Name: Richard Montes Lemus

Perm: 1709109

Math 34A Midterm 2

(100 pts total)

1. (6 pts) Use the log table provided with this exam to find

(a) (4 pts)  $10^{1.820}$

$$10^1 \times 10^{.820}$$

$$10^1 \times 6.61$$

$$\boxed{66.1}$$

$$\boxed{66.1}$$

(b) (8 pts)  $\log(9.973/8.980)$

$$\log(9.973) - \log(8.980)$$

$$0.9987 - .9533$$

$$\begin{array}{r} 0.9987 \\ - .9533 \\ \hline \end{array}$$

$$\boxed{.0454}$$

$$\boxed{.0454}$$

(c) (12 pts)  $\log(\sqrt[5]{537})$

$$\log(\sqrt[5]{537})$$

$$\log(537)^{\frac{1}{5}}$$

$$\frac{1}{5} \log(537)$$

$$\frac{1}{5} \log(5.37 \times 10^2)$$

$$\frac{1}{5} \log(5.37) + \frac{1}{5} \log(10^2)$$

$$\frac{1}{5}(7300) + \frac{1}{5}(2)$$

$$\frac{7300}{5} + \frac{2}{5} = \boxed{\frac{27300}{5}}$$

?

$$\boxed{\frac{27300}{5}}$$

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$10^{2x-3} = 2^{10}$$

$$\log(10^{2x-3}) = \log(2^{10})$$

$$\frac{(2x-3)\log(10)}{\log(10)} = \frac{10\log(2)}{\log(10)}$$

$$2x-3 = \frac{10\log(2)}{\log(10)}$$

$$x - \frac{3}{2} = \frac{10\log(2)}{2\log(10)}$$

$$x = \frac{10\log(2)}{2\log(10)} + \frac{3}{2}$$

$$x = \frac{10 \cdot 0.3010}{2 \cdot 1} + \frac{3}{2}$$

$$x = \frac{3.010}{2} + \frac{3}{2}$$

$$x = \frac{6.010}{2}$$

$$x = \boxed{\frac{6.010}{2}}$$

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$x_1 y_1$

$$\frac{5-3}{-2-(-4)} = \frac{2}{2} = 1$$

$$\begin{aligned} 5 &= 1(-2) + b \\ 5 &= -2 + b \\ +2 &+2 \\ \hline b &= 7 \end{aligned}$$

$$y = 1x + 7$$

$$\begin{aligned} 5 &= 1(-2) + 7 \\ 5 &= -2 + 7 \\ 5 &= 5 \checkmark \end{aligned}$$

$$y = \boxed{1x + 7}$$

- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$x_1 y_1$

$$\frac{3}{5}$$

$$10 = \frac{3}{5}(4) + b$$

$$10 = \frac{12}{5} + b$$

$$-\frac{12}{5} \quad -\frac{12}{5}$$

$$\frac{10 - \frac{12}{5}}{5} = b$$

$$\frac{50 - 12}{5} = b$$

$$\frac{38}{5} = b$$

$$y = \boxed{\frac{3}{5}x + \frac{38}{5}}$$

$$2x^5 = 15$$

$$x^5 = 16$$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$x - 8 = 1 - \frac{1}{2}x$$

$$+ 8 \quad + 8$$

$$Y = 6 - 8$$

$$\boxed{Y = -2}$$

$$x = 1 - \frac{1}{2}x + 8$$

$$x = -\frac{1}{2}x + 9$$

$$+\frac{1}{2}x \quad +\frac{1}{2}x$$

$$\underline{x + \frac{1}{2}x} = 9$$

$$\frac{2x + 1x}{2} = 9$$

$$2\left(\frac{3x}{2}\right) = 4(9)$$

$$\frac{3x}{2} = 18$$

$$\frac{3}{3}(x) = \frac{18}{3}$$

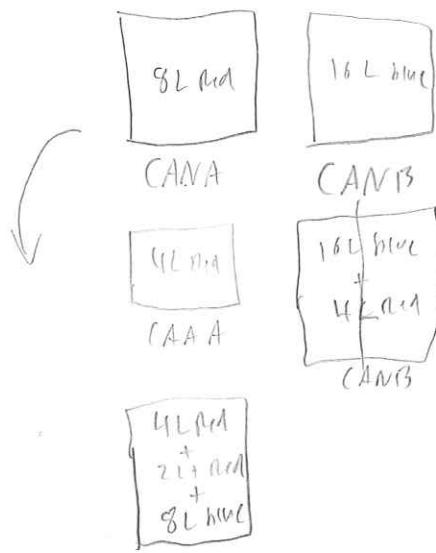
$$\boxed{x = 6}$$

$$(x, y) =$$

$$\boxed{(6, -2)}$$

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?



CAN A

$$\boxed{14 \text{ L of paint}}$$

L

8 L of blue

$$2 \times 2 = 4$$

$$|k| = 1$$

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

- (a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$+_1$

$$\frac{\Delta f}{\Delta t} = \frac{f(+_1) - f(+_0)}{(+_1 - +_0)}$$

$$\frac{(1.2)^2 - (1.0)^2}{1.2 - 1}$$

$$\frac{1.44 - 1}{2}$$

$$\frac{.44}{2}$$

$$.22$$

$$.22 \quad m/s$$

- (b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1+h$  seconds.

$+_1$

$$\frac{f(1+h) - f(1)}{1+h - 1}$$

$$\frac{1+2h+h^2 - 1}{h}$$

$$\frac{(1+h)^2 - (1)^2}{h}$$

$$\frac{2h+h^2}{h}$$

$$2+h$$

$$(1+h)(1+h)$$

$$1+h+h+h^2$$

$$1+2h+h^2$$

$$2+h \quad m/s$$

- (c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped? released

We would set the lim to  $h \rightarrow 0$ , meaning  $h$  is approaching zero, then solve by simplifying the equation above and finally plugging zero into the  $h$  variable,  $(2+0)$

$$\text{Total profit} = (\text{one cent per card})(\text{# of cards})$$

$$11 \boxed{5000}$$

$$\begin{array}{r} 5000 \\ -10h \\ \hline 5000-10h \end{array}$$

- 6 (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ).

$$\begin{array}{l} x = 500 - 10h \quad \text{total profit} = (10 + h)(500) \\ 10h \end{array}$$

$h$  = extra cents charged

$$\frac{\text{Total profit}}{10h} = \frac{(10+h)(500-10h)}{(10+h)}$$

$$\frac{5000}{10+h} = \frac{5000-h \text{ of cards}}{10+h}$$

$$x = (10+h)(500-10h)$$

$$500 - 10(1)$$

$$\begin{array}{r} 490 \\ 500 - 10(2) \\ \hline 480 \end{array}$$

$$\boxed{500-10h} \text{ cards}$$

- (b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)$ ¢ each. Please simplify your answer (it should be in terms of  $h$ ).

$$5000 = (10+h)(500-10h)$$

5

$$(10+h)(500-10h)$$

$$(490)(11)$$

$$5000 - 100h + 500h - 10h^2$$

$$\begin{array}{r} 490 \\ 11 \\ \hline 1 \end{array}$$

$$5000 + 400h - 10h^2$$

$$5000 + 400(1) + 10(1)^2$$

$$5000 + 400 + 10(1)$$

$$5000 + 400 + 10$$

$$\boxed{5410}$$

$$\boxed{-10h^2 + 400h + 5000} \text{ ¢}$$

$$2 \overline{)97} \quad \begin{array}{l} 9 \\ 8 \\ \hline 17 \\ -12 \\ \hline 5 \end{array}$$

$$\begin{array}{r} 6 \times 5 = 30 \\ 6 \times 6 = 36 \\ 6 \times 7 = 42 \end{array}$$

$$\begin{array}{r} 36 + 6 \\ \hline 42 \end{array}$$

$$\begin{array}{r} 46 \\ \times 2 \\ \hline 92 \end{array}$$

7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2}$$

$$\frac{4(4+1)}{2} + \frac{5(5+1)}{2} + \frac{6(6+1)}{2}$$

$$\boxed{46}$$

$$\frac{4(5)}{2} + \frac{5(6)}{2} + \frac{6(7)}{2}$$

$$\frac{20}{2} + \frac{30}{2} + \frac{42}{2}$$

$$\frac{50+42}{2}$$

$$\frac{92}{2} = \boxed{46}$$

8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

$$\cancel{48+48+24h+3h^2}$$

$$\frac{24h+3h^2}{h}$$

$$\cancel{h} \frac{(24+3h)}{\cancel{h}}$$

$$24+3(h)$$

$$24+3(0)$$

$$24+0$$

$$\boxed{24}$$

$$\boxed{24}$$

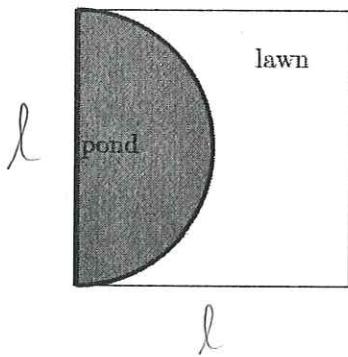
$$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$$

$$\frac{1}{2}$$

$$-2 \cdot 2 = -4$$

$$(2 - \sqrt{2})^2 = 2 - \frac{2}{2} = \boxed{1}$$

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



$$\sqrt{900} = \sqrt{\ell^2}$$

$$\ell = \sqrt{900}$$

$$r = \frac{\ell}{2} = \left(\frac{\sqrt{900}}{2}\right)$$

$$A = \frac{1}{2} \pi r^2$$

$$A = \frac{1}{2} \pi \left(\frac{\sqrt{900}}{2}\right)^2$$

$$A = \frac{1}{2} \pi \left(\frac{900}{4}\right)^2$$

$$A = \frac{1}{2} \pi \frac{900}{4}$$

Semicirc.  $r = \frac{1}{2} \ell$

$$A = \frac{1}{2} (\pi r^2)$$

$$A = \frac{1}{2} \pi \left(\frac{1}{2}(\sqrt{900})\right)^2$$

$$A = \frac{1}{2} \pi \left(\frac{1}{2}\right)^2 \left(900^{\frac{1}{2}}\right)^2$$

$$A = \frac{1}{2} \pi \left(1 \cdot (900)\right)$$

$$A = \frac{1}{2} \pi (900)$$

$$A = \frac{1}{2} \pi 900$$

$$\frac{900}{12} = \frac{\pi(900)}{2}$$

$$\frac{1800 - \pi(900)}{2}$$

Area of  
semi  
circle

Area of  
square

area  
of  
square

$$A = \ell^2$$

$$A = 900$$

$$900 - \left(\frac{1}{2} \pi (900)\right)$$

lawn area =

$$\frac{1800 - (\pi(900))}{2}$$

$\text{m}^2$

Name: Franci Adjengba

Perm: 5eau4sc 6

Math 34A Midterm 2

(100 pts total)

1. (6 pts) Use the log table provided with this exam to find

(a) (4 pts)  $10^{1.820}$

$$10^{1+0.82} \\ 10^1 \times 4.61$$

660.1

(b) (8 pts)  $\log(9.973/8.980)$

$$= \log(9.973) - \log(8.980) \\ .9987 - .9533$$

$$\begin{array}{r} .9987 \\ - .9533 \\ \hline \end{array}$$

.0454

(c) (12 pts)  $\log(\sqrt[5]{537})$

$$\log(537)^{1/5}$$

$$\frac{1}{5} \log(537)$$

$$\frac{1}{5} \log(537 \cdot 10^2)$$

2.73  $\cdot \frac{1}{5}$

$$\frac{1}{5} \log(537) + \log\left(\frac{10^2}{7300+2}\right)^2$$

2.7300

2. (8 pts) Use properties of logs to solve for  $x$ . Use the log table to evaluate any logs in your answer and simplify completely.

$$10^{2x-3} = 2^{10}$$

$$\log(10^{2x-3}) = \log(2^{10})$$

$$2x-3 = \log(10)$$

$$2x-3 = 10 \log(2) = 2x-3 = 3.0 + 3.0$$

$$x = \boxed{3}$$

$$\frac{2x-6}{2} = \frac{6}{2}$$

3. (a) (4 pts) Find the equation of the line that passes through the points  $(-4, 3)$  and  $(-2, 5)$ . Give the answer in the form  $y = mx + b$ .

$(x, y)$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{5-3}{-2-(-4)} = \frac{2}{2} = 1$$

$$5 = -2 + B$$

$$B = 7$$

$$y = 1x + 7$$

$$y = \boxed{1x + 7}$$

- (b) (4 pts) Find the equation of the line that has slope  $\frac{3}{5}$  and goes through the point  $(4, 10)$ . Give the answer in the form  $y = mx + b$ .

$x \ y$

$$\begin{array}{r} 2.4 \\ 5 \overline{) 12} \\ -10 \\ \hline 20 \\ -20 \\ \hline 0 \end{array}$$

$$10 = \frac{3}{5}4 + B$$

$$10 = 2.4 + B$$

$$\begin{array}{r} 10.0 \\ -2.4 \\ \hline 7.6 \end{array}$$

$$y = \boxed{\frac{3}{5}x + 7.4}$$

$$y = \frac{3}{5}x + 7.4$$

3. (c) (4 pts) What are the coordinates of the point where the lines  $y = x - 8$  and  $y = 1 - \frac{1}{2}x$  intersect?

$$\checkmark \\ -2 = 1 - 3$$

$$y = -\frac{1}{2}x + 1 \quad 6 - 8 = -2$$

$$(x - 8) = -\frac{1}{2}x + 1$$

$$(x - 8) = -\frac{x}{2} + 1 \quad x = 6$$

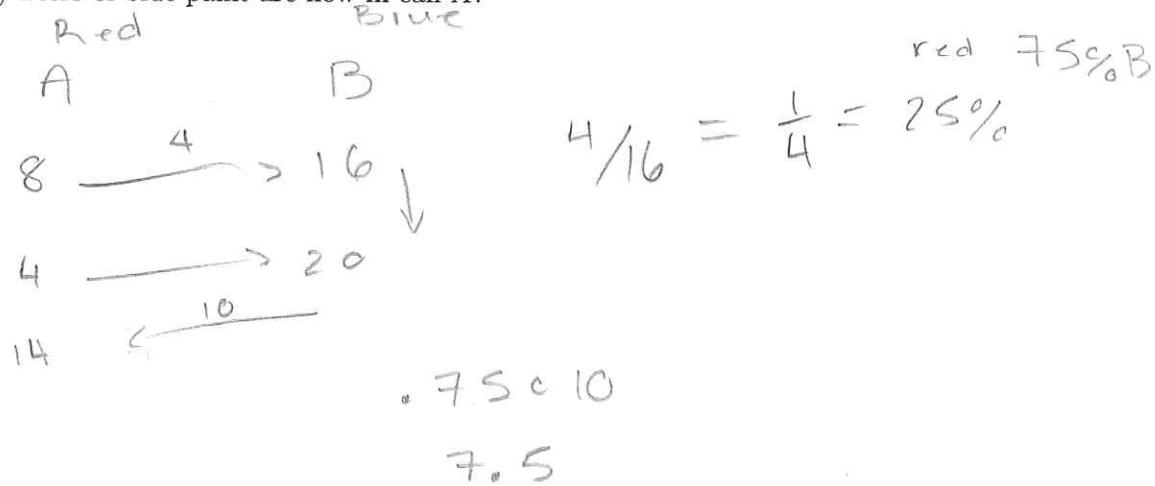
$$x = \frac{-x + 9}{2} \quad \frac{3x}{3} = \frac{18}{3}$$

$$2x = x + 18$$

$$(x, y) = (6, -2)$$

4. (8 pts) Initially, can A contains 8 liters of red paint and can B contains 16 liters of blue paint. I pour half of the red paint into can B. After mixing the paint in can B, I pour half of the paint in can B into can A.

How many liters of blue paint are now in can A?



7.5 L

5. (12 pts) The distance traveled by a rising helium balloon  $t$  seconds after leaving a child's hand is modeled by  $f(t) = t^2$  meters.

- (a) (4 pts) Find the average speed of the balloon over the time period from 1 second to 1.2 seconds.

$$\frac{1.44 - 1}{1.2 - 1} = \frac{0.44}{0.2} = 0.22$$

$0.22$  m/s

- (b) (4 pts) Find the average speed of the balloon over the time period from 1 second to  $1 + h$  seconds.

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

$2+h$  m/s

- (c) (4 pts) In your own words, what would we do to find the instantaneous speed of the balloon exactly 1 second after it was dropped?

I would divide  $\frac{1^2 - 0^2}{1 - 0}$  by a time  
distance

6. (8 pts) An enterprising 34A student observes that many students forgot to bring 3x5 note cards with them to Midterm 1. She has plenty of packages of note cards lying around, so she decides to sell them to students all over campus. If she charges 10 cents a card, she will sell 500 cards. But for each cent she increases the price, the number of cards she sells will decrease by 10.

- (a) (4 pts) If she picks a price of  $(10 + h)$ ¢ per card, find the number of cards she will sell (in terms of  $h$ ). <sup>3</sup>

$$\text{Brwn}$$

$$500 - 10h = 500$$

$$-10h$$

$$(10 + h) \text{¢} = 500$$

$$10 + h$$

$$500$$

$$y = -10n + 500$$

$$\boxed{-10n + 500} \text{ cards}$$

- (b) (4 pts) Use your answer from part (a) to find the total amount of money (in cents) she will receive from selling cards if her price is  $(10 + h)$ ¢ each. Please simplify your answer (it should be in terms of  $h$ ).

$$y = -10n + 500$$

$$\frac{-10n}{-10} = \frac{-500}{-10}$$

$$\boxed{\quad} \text{¢}$$

7. (8 pts) Compute the following sum (your answer should be a number).

$$\sum_{n=4}^6 \frac{n(n+1)}{2}$$

46

$$\frac{4(4+1)}{2} + \frac{5(5+1)}{2} + \frac{6(6+1)}{2} = \frac{30}{2} + \frac{42}{2} = 21$$
$$\underline{21} = 10 + 15 + 21 =$$

46

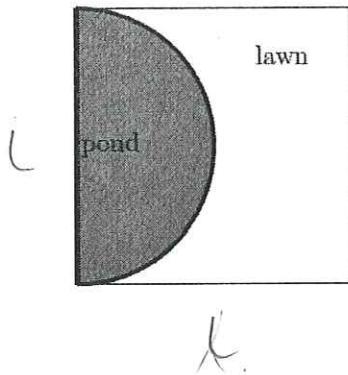
8. (8 pts) Find  $\lim_{h \rightarrow 0} \frac{48+24h+3h^2-48}{h}$

~~$$48 + 24 + 3h^2 - 48$$~~

24 +

24

9. (12 pts) A square garden consists of a semicircular pond and the rest is a lawn. The length of each side of the square garden is  $\ell$ . If the area of the square is  $900 \text{ m}^2$ , then find the area of the lawn.



$$\ell \cdot \ell = 900$$

$$\sqrt{\ell^2} = \sqrt{900}$$

$$\ell = \sqrt{900}$$

~~$$2\pi r = c$$~~

~~$$2\pi\sqrt{900}$$~~

~~$$2\pi(\sqrt{900} \cdot \frac{1}{2})$$~~

~~2~~

$$900 - \pi(\sqrt{900} \cdot \frac{1}{2})$$

lawn area = 
$$[900 - \pi(\sqrt{900} \cdot \frac{1}{2})] \text{ m}^2$$