MATH E-3
ASSIGNMENT 3 **TOTAL POSSIBLE POINTS = 70**

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PLEASE BE NEAT, SHOW YOUR WORK FOR PARTIAL OR FULL CREDIT.
If your answer contains decimals, round it to 2 decimal places.

Solve these problems:

1. 30% of 570 = 171 — 1 point

.30 × 570
=
Answer: 171

2. 3.5% of 900 = 31.5 — 1 point

.035 × 900
=
Answer: 31.5

3. What % of 840 is 150? — 2 points

$\frac{840x}{840} = \left(\frac{150}{840}\right)100 \rightarrow (.178571)100 \rightarrow 17.8571$ ↓ Round

Answer: 17.86%

$x = 17.86\%$

4. $93.50 is 30% of what? — 2 points

$\frac{93.50}{.30} = \frac{.30x}{.30}$

$x = 311.667$ Round: $311.67

Answer: $311.67

5. What is 280 increased by 15%? — 2 points

(1 + .15)280

(1.15)280 = 322

Answer: 322

6. I heard on the news a while back that Macy's was cutting 2000 jobs, or 8% of its total workforce. What was the size of its work force before the cuts? — 2 points

$(.08)x = \left(\frac{2000}{x}\right)x$

$\frac{.08x}{.08} = \frac{2000}{.08} \rightarrow x = 25000$

Answer: The size of the workforce before the cuts were 25,000 jobs.

For Problems 7, rewrite as a decimal, and for 8 and 9, solve the problem and rewrite as decimals:

7. 60% → .6 Answer: .6 — 1 point

8. 4/5 of 1% $\left(\frac{4}{5}\right)\frac{.01}{1} = \frac{.04}{5} = .008$ Answer: .008 — 1 point

9. 4% of 50% $(.04)(.5) = .02$ Answer: .02 — 1 points

10. A store offers a 15% discount on clothing; then a week later it offers another 35% discount. What is the total discount? Is it 50%? Explain. (Since no actual prices are given, you can "make up" a price to use in your calculations). **ROUND TO 2 D.P.**

$100 is "make up" price. — 4 points

.15 × 100 = 15
100 − 15 = 85
.35 × 85 = 29.75
15 + 29.75 = 44.75

$44.75\% = \left(\frac{44.75}{100}\right).100$

We don't add the percentages (15% + 35% = 50%). We start discounting our base value of 100 and apply discounts to markdown prices accordingly. Total discount is 44.75% if base price is $100.

11. Convert these numbers in the chart below to a fraction, decimal, or percent. 20 points

Fraction	Decimal	Percent
1	1.	100%
50/100	.50	50%
1/3	.33...	33.3%
1/4	.25	25%
6666/10000	.6666	66.66%
125/1000	.125	12.5%
1/10	.1	10%
6/10	.6	60%
1/1000	.001	0.1%
99/100	.99	99%

Use this data for problems 12 through 16: Give your answers as percentages rounded to TWO decimal places.

Here are some figures relating to the Standard & Poor's 500 index from this past year. I got the data from this website, which plots charts as well as giving you numbers for a particular date:

http://moneycentral.msn.com

October 1, 2012	January 18, 2013	April 26, 2013	July 3, 2013	Hypothetical Aug
1428.59	1485.98	1582.24	1615.41	1428.59

See 1683.42

Clearly this has been a good time for the S&P 500! Do the following calculations:

12. Find the percent increase for each of the periods October to January, January to April, April to July. Which is the biggest percent increase? Is it also the biggest *amount* increase?

7 points

Oct - Jan Answer: 4.02% increase

$4.02\% = \frac{(1485.98 - 1428.59)}{1428.59}\ 100$

Jan - April Answer: 6.48% increase

$6.48\% = \frac{(1582.24 - 1485.98)}{1485.98}\ 100$

April - July Answer: 2.10% increase

$2.10\% = \frac{(1615.41 - 1582.24)}{1582.24}$

Jan - April has the largest percent increase of 6.48% out of the three periods.

3

Out of the three periods, Jan - April has the largest amount increase of $96.26. However, the largest amount increase is from the periods between Oct - July, 1615.41 - 1428.59 = $186.82, increase

13. Calculate the percent increase going directly from October 1, 2012 to July 2013 (i.e. from 1428.59 to 1615.41). 2 points

$$13.08\% = \frac{(1615.41 - 1428.59)}{1428.59} \cdot 100$$

14. Is sum of the three percentages in number 12 the same percentage as the one percentage calculated in the question 13? Why or why not? 2 points

The sum of the three percentages are the same if you set the "Old Value" using the October value of $1428.59 in the denominator.

$$13.08\% = \left(\frac{(1615.41 - 1428.59)}{1428.59} = \frac{(1615.41 - 1582.24)}{1428.59} + \frac{(1582.24 - 1485.98)}{1428.59} + \frac{(1485.98 - 1428.59)}{1428.59} \right) \cdot 100$$

(Jul, Oct) (Jul, Apr) (Apr, Jan) (Jan, Oct); denominator: Oct

If you split Oct - July into three periods, then we will have a result like the case of question 12.

$$12.60\% = \left(\frac{(1615.41 - 1582.24)}{1582.24} + \frac{(1582.24 - 1485.98)}{1485.98} + \frac{(1485.98 - 1428.59)}{1428.59} \right) \cdot 100$$

(Jul, Apr) (Apr, Jan) (Jan, Oct); denominators: Apr, Jan, Oct

15. If hypothetically the S & P were to decrease from the July 2013 figure back down to the original figure (i.e. from 1615.41 down to 1428.59), what percent decrease would this be? Is it the same as your answer for problem 13 (not counting the negative sign)? Explain.

3 points

If we consider hypothetical August and use the Oct starting value we have:

$$-13.08\% = \left(\frac{(1428.59 - 1615.41)}{1428.59} \right) \cdot 100$$

(Aug, July); denominator: Oct

It is -13.08% because of a decrease back to the original October value of $1428.59
The increase reflects question # 13.

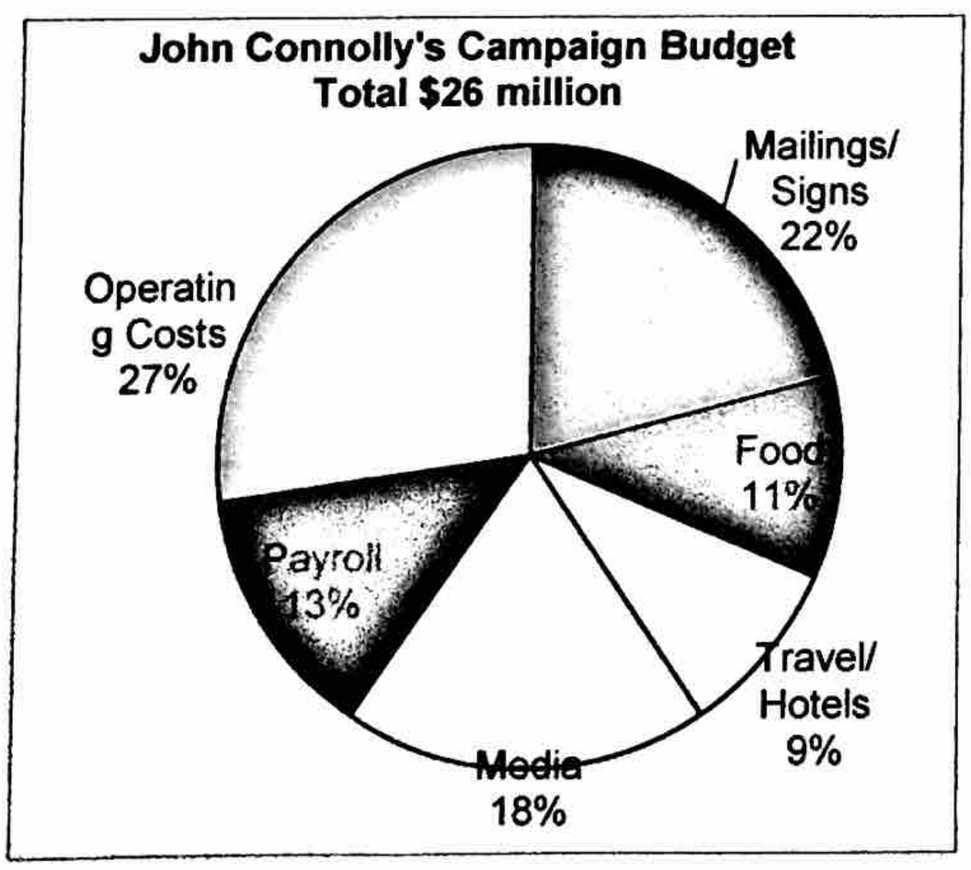
16. As of right now (close of the market on September 12, 2013, the S&P is at **1683.42.** What percent increase is this from the July 3, 2013 figure? 2 points

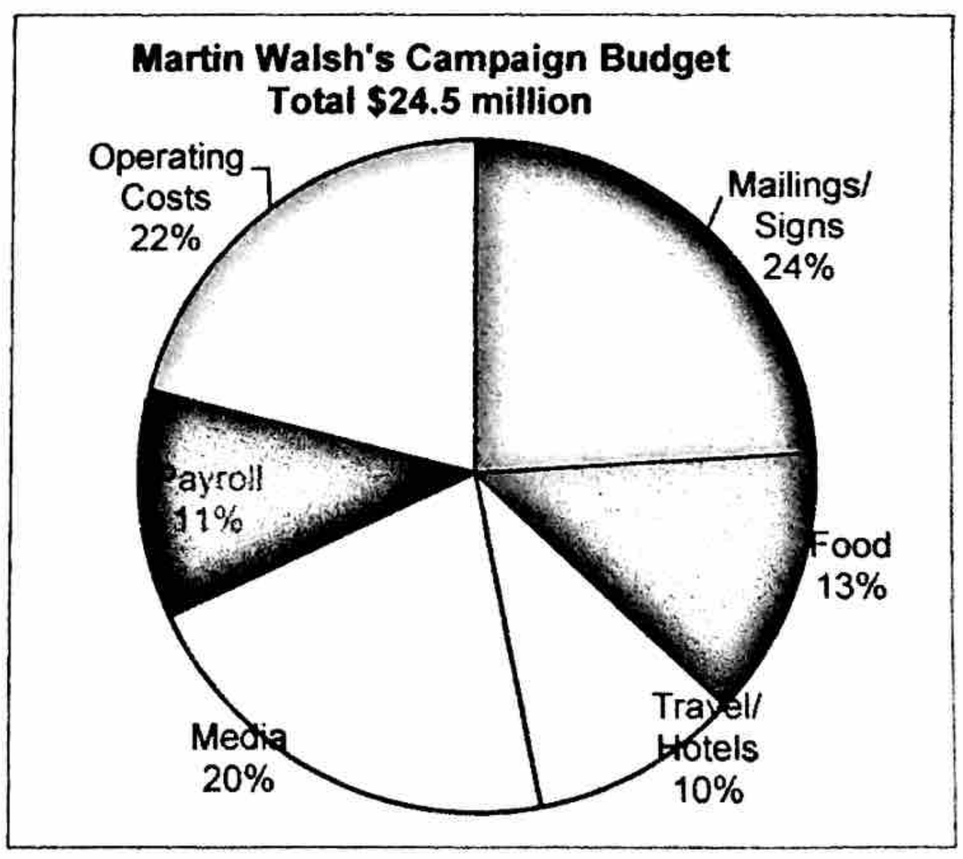
$$4.21\% = \left(\frac{(1683.42 - 1615.41)}{1615.41}\right) \cdot 100$$

Answer: 4.21% increase

Problems 17 and 18:

Mayoral campaign spending will be brisk in the city of Boston this year, as Mayor Menino has decided to retire after many years running the city of Boston. During the 2013 campaign, the hypothetical budgets of two of the candidates are represented below. Let's assume candidates John Connolly and Martin Walsh have six major expenses as shown in the pie charts below. **At the beginning of the campaign, John Connolly estimated he would need to spend $26 million dollars and Martin Walsh estimated he would spend $24.5 million.**





Answer the following based on the information included above and in the pie charts.
You must justify your answers by showing your work in order to get credit. Do not just give a name or a single number as the answer.

17. Which candidate will spend more money on the Media? 5 points

John Connolly Media Expense

$.18(26,000,000)$

$=$

4.68×10^6

$=$

$\$4,680,000$

Martin Walsh's Media Expense

$.2(24,500,000)$

$=$

4.9×10^6

$=$

$\$4,900,000$

Martin Walsh spent more money on media at $4,900,000.

18. Martin Walsh wants to save some money, so he asked an aide to calculate what he should cut to save the most money. Which budget should he reduce to save more money? Should he reduce Operating Costs by 15% or cut the food budget by 25%? Show your work.

Total = $24.5 million 5 points

Operating Costs at 22%

$.22(24500000)$

5.39×10^6

$\$5,390,000$

$.15(5390000)$

$\$808,500$

Food at 13%

$.13(24500000)$

3.185×10^6

$\$3,185,000$

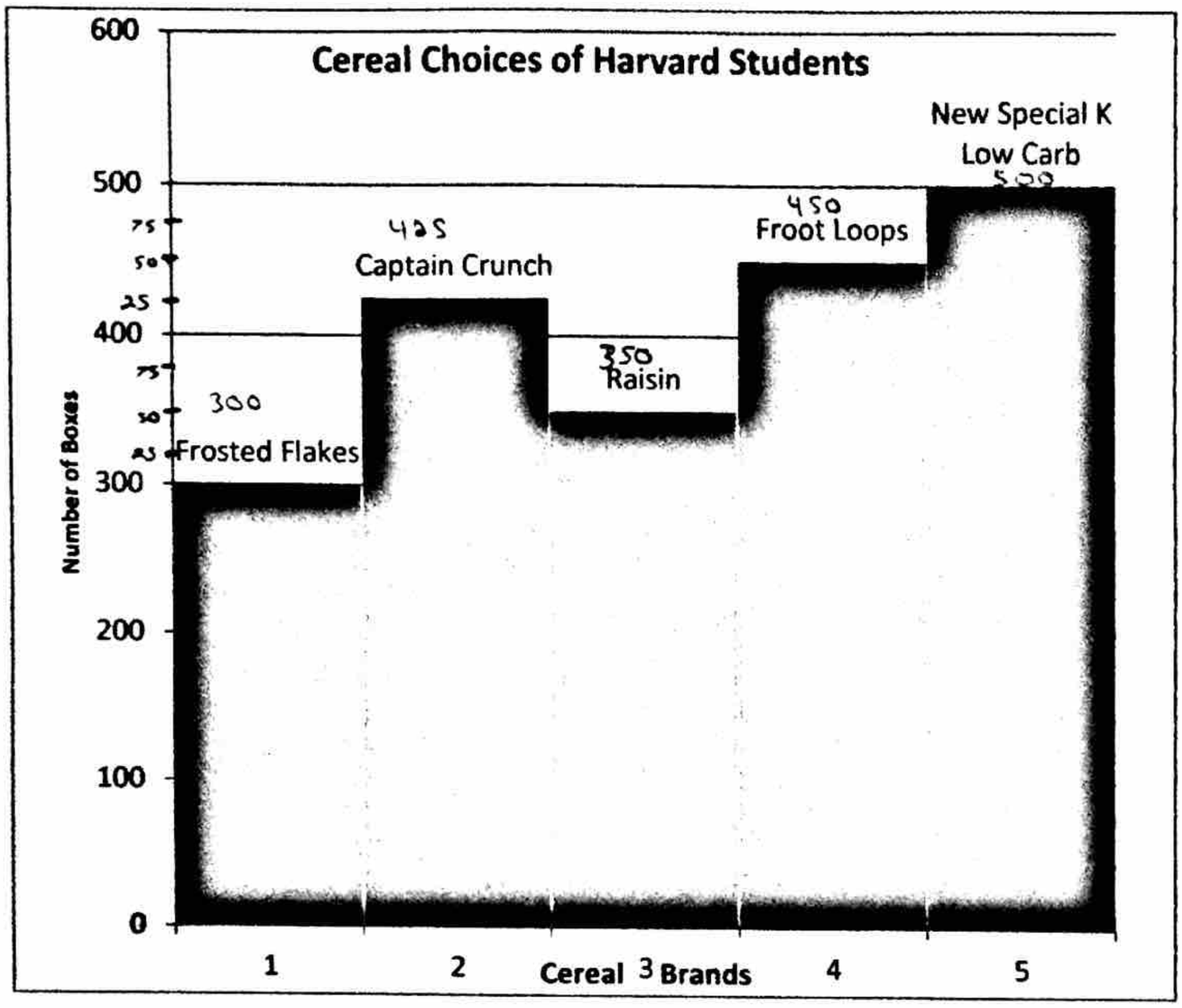
$.25(3185000)$

$\$796,250$

To save money, Mr. Walsh should cut the food budget by 25%.

Problems 19 to 22:

The Harvard Student Union is doing a study to determine which types of cereal are the most popular to serve at breakfast. The histogram below gives the total number of boxes eaten per week for five different kinds of cereals. If a histogram is difficult to read, you should make some notation to make it clear. In this case, since the number of boxes of Captain Crunch cereal is not clear, a note is given below. All the other amounts of cereals can be read from the graph below.



Note: The number of boxes of Captain Crunch cereal is 425.

19. How many boxes of cereal are eaten every week at the Union? 1 point

Total = FF + CC + R + FL + SK

2025 = 300 + 425 + 350 + 450 + 500

2025 boxes are consumed weekly.

20. What percent of the boxes consumed are produced by Kelloggs if Kelloggs makes all of the cereals except Raisin Bran and Captain Crunch? **(ROUND to 1 d.p.)** 2 points

Part

FF 300
FL 450
SK +500
1250 boxes

Whole

FF 300
CC 425
R 350
FL 450
SK +500
2025 boxes

$61.7\% = \left(\frac{1250}{2025}\right) 100$

61.7% are Produced

21. Normally the Union pays 16 cents a box for the cereal which they purchase. However, due to an over-supply of sugar, the price of Captain Crunch and Frosted Flakes is only 12 cents a box. How much must the Union pay every week to purchase all of the cereal that it needs? 2 points

$295 = \underset{FF}{.12(300)} + \underset{CC}{.12(425)} + \underset{R}{.16(350)} + \underset{PL}{.16(450)} + \underset{SR}{.16(500)}$

The Union Pay $295 weekly.

22. What percentage decrease in weekly costs (not in price per box) does this drop of 4 cents represent? 2 points

New Value

295

Old Value

$324 = .16(300) + .16(425) + .16(350) + .16(450) + .16(500)$

$-8.9506\% = \left(\frac{(295-324)}{324}\right) 100$

Round to 1 decimal place

-9%

A drop of 4 cents represents a 9% decrease.