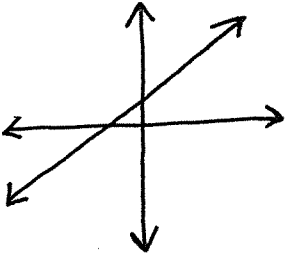
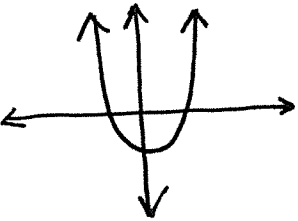
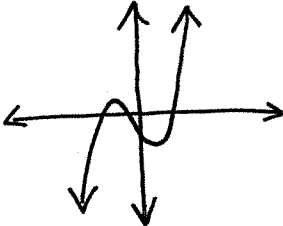
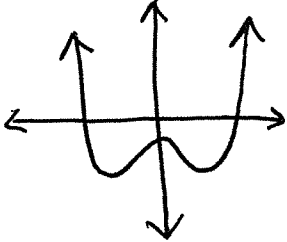


Name: Key

Hour: SEMESTER 2 EXAM REVIEW

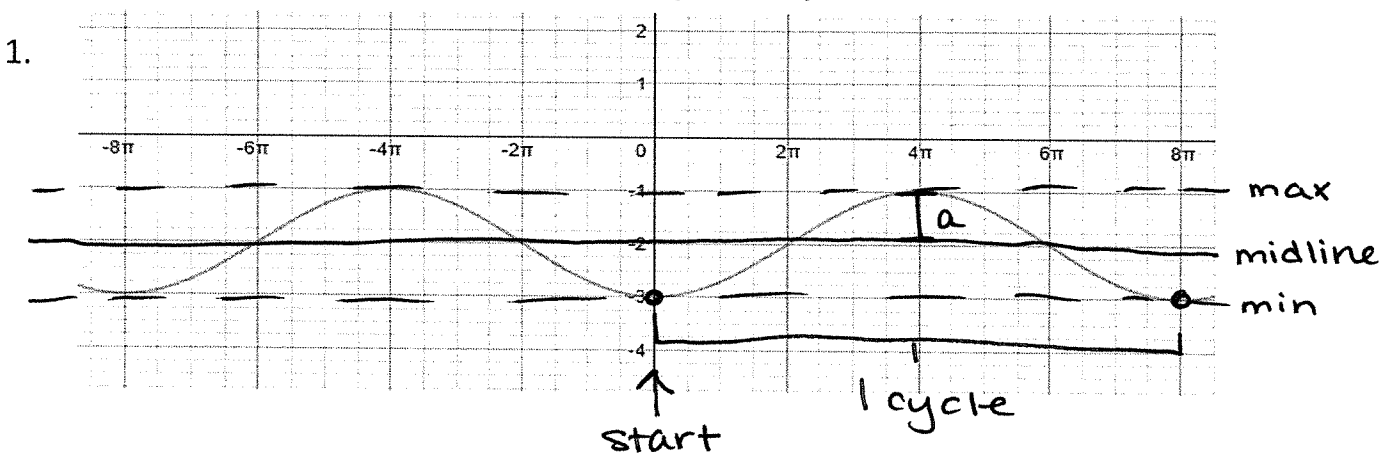
Polynomials

|  |   |  |   |  |       |      |      |     |       |        |       |      |        |       |     |
|--|---|--|---|--|-------|------|------|-----|-------|--------|-------|------|--------|-------|-----|
| <p>1. Sketch a linear function</p>    | <p>2. Sketch a quadratic function</p>  | <p>3. Sketch a cubic function</p>    | <p>4. Sketch a quartic function</p>  |  |       |      |      |     |       |        |       |      |        |       |     |
| <p>5. Identify the end behavior for the following functions.</p> <p>a) <math>4x^3 + 2x^2 - 1</math><br/> <b>positive odd</b><br/> as <math>x \rightarrow +\infty, f(x) \rightarrow +\infty</math><br/> as <math>x \rightarrow -\infty, f(x) \rightarrow -\infty</math></p> <p>b) <math>-5x^2 + 6x - 7</math><br/> <b>negative even</b><br/> as <math>x \rightarrow +\infty, f(x) \rightarrow -\infty</math><br/> as <math>x \rightarrow -\infty, f(x) \rightarrow -\infty</math></p> <p>c) <math>3x^4 - 7x + 8</math><br/> <b>positive even</b><br/> as <math>x \rightarrow +\infty, f(x) \rightarrow +\infty</math><br/> as <math>x \rightarrow -\infty, f(x) \rightarrow +\infty</math></p> <p>d) <math>-2x^5 + 5x^3 - x^7</math><br/> <b>negative odd</b><br/> as <math>x \rightarrow +\infty, f(x) \rightarrow -\infty</math><br/> as <math>x \rightarrow -\infty, f(x) \rightarrow +\infty</math></p> |   | <p>6. Solve:</p> <p style="text-align: right;">Set <math>x^2 = z</math>,<br/> then <math>x^4 = z^2</math></p> $x^4 - x^2 - 12$ $z^2 - z - 12$ $(z - 4)(z + 3)$ $(x^2 - 4)(x^2 + 3)$<br>$x^2 - 4 = 0$ $\sqrt{x^2} = \sqrt{4}$ $x = \pm 2$<br>$x^2 + 3 = 0$ $\sqrt{x^2} = \sqrt{-3}$ $x = \pm i\sqrt{3}$   |   |  |       |      |      |     |       |        |       |      |        |       |     |
| <p>7. Find the x-intercepts and the y-intercept.</p> <p><math>a &gt; 1</math>, use quad formula <math>6x^2 + x - 2</math></p> $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-1 \pm \sqrt{1^2 - 4(6)(-2)}}{2(6)} = \frac{-1 \pm 7}{12}$ <p>x - intercept(s): <math>x = \frac{1}{2}, x = -\frac{2}{3}</math><br/> y - intercept: <math>(0, c) \rightarrow (0, -2)</math></p> $x = \frac{-1+7}{12} = \frac{6}{12} = \frac{1}{2} \quad x = \frac{-1-7}{12} = \frac{-8}{12} = -\frac{2}{3}$   |   | <p>8. Multiply</p> $(x^2 + 5x - 3)(x - 1)$ <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td><math>x^2</math></td> <td><math>5x</math></td> <td><math>-3</math></td> </tr> <tr> <td><math>x</math></td> <td><math>x^3</math></td> <td><math>5x^2</math></td> <td><math>-3x</math></td> </tr> <tr> <td><math>-1</math></td> <td><math>-x^2</math></td> <td><math>-5x</math></td> <td><math>3</math></td> </tr> </table> $x^3 + 5x^2 - x^2 - 3x - 5x + 3$ $x^3 + 4x^2 - 8x + 3$ |   |  | $x^2$ | $5x$ | $-3$ | $x$ | $x^3$ | $5x^2$ | $-3x$ | $-1$ | $-x^2$ | $-5x$ | $3$ |
|  | $x^2$   | $5x$   | $-3$  |  |       |      |      |     |       |        |       |      |        |       |     |
| $x$  | $x^3$   | $5x^2$   | $-3x$   |  |       |      |      |     |       |        |       |      |        |       |     |
| $-1$   | $-x^2$  | $-5x$  | $3$   |  |       |      |      |     |       |        |       |      |        |       |     |
| <p>9. Evaluate the polynomial for the values given.</p> $f(x) = x^3 + 2x - 1$ <p>a) <math>f(0)</math><br/> <math>= 0^3 + 2(0) - 1 = -1</math></p> <p>b) <math>f(2)</math><br/> <math>= 2^3 + 2(2) - 1 = 8 + 4 - 1 = 11</math></p>  |   | <p>10. Given the following zeros, write the function in factored form.</p> <p><math>(-2, 0)(4, 0)(-5, 0)</math><br/> <math>x = -2, x = 4, x = -5</math></p> $f(x) = (x + 2)(x - 4)(x + 5)$   |   |  |       |      |      |     |       |        |       |      |        |       |     |

$a = -1$  Key

|   |  |     |    |     |    |  |   |  |  |  |  |    |    |    |  |  |   |   |    |     |   |   |   |     |   |    |  |   |    |    |     |  |   |    |    |   |
|---|--|-----|----|-----|----|--|---|--|--|--|--|----|----|----|--|--|---|---|----|-----|---|---|---|-----|---|----|--|---|----|----|-----|--|---|----|----|---|
| <p>11. Simplify. <math>(-4 + 5i)(-2 - 7i)</math></p> $8 + 28i - 10i - 35i^2$ $8 + 18i - 35(-1) = 8 + 18i + 35$ $= 43 + 18i$   | <p>12. Simplify. <math>(3 - 4i) - (-5 + 7i)</math> <span style="float: right;">*combine like terms</span></p> $(3 - 4i) + (5 - 7i)$ $8 - 11i$  |     |    |     |    |  |   |  |  |  |  |    |    |    |  |  |   |   |    |     |   |   |   |     |   |    |  |   |    |    |     |  |   |    |    |   |
| <p>13. Solve and state the y - intercept. <math>(0, c) \rightarrow (0, -3)</math></p> $x^2 - 6x - 3 = 0$ $x = \frac{6 \pm \sqrt{6^2 - 4(1)(-3)}}{2(1)} = \frac{6 \pm \sqrt{48}}{2} = \frac{6 \pm 4\sqrt{3}}{2}$ $x = 3 \pm 2\sqrt{3}$   | <p>14. Solve and state the y - intercept. <math>\rightarrow (0, 2)</math></p> $3x^2 + 4x + 2 = 0$ $x = \frac{-4 \pm \sqrt{4^2 - 4(3)(2)}}{2(3)} = \frac{-4 \pm \sqrt{-8}}{6} = \frac{-4 \pm 2i\sqrt{2}}{6}$ $x = -\frac{2 \pm i\sqrt{2}}{3}$ |     |    |     |    |  |   |  |  |  |  |    |    |    |  |  |   |   |    |     |   |   |   |     |   |    |  |   |    |    |     |  |   |    |    |   |
| <p>15. Divide.</p> $(5x^3 - 8x^2 + 9x + 12) \div (x - 3)$ <table style="margin-left: 20px;"> <tr><td>3</td><td>5</td><td>-8</td><td>9</td><td>12</td></tr> <tr><td></td><td>↓</td><td></td><td></td><td></td></tr> <tr><td></td><td>15</td><td>21</td><td>90</td><td></td></tr> <tr><td></td><td>5</td><td>7</td><td>30</td><td>102</td></tr> </table> <p style="text-align: right;">change sign</p> $5x^2 + 7x + 30 + \frac{102}{x-3}$ | 3  | 5   | -8 | 9   | 12 |  | ↓ |  |  |  |  | 15 | 21 | 90 |  |  | 5 | 7 | 30 | 102 | <p>16. Divide.</p> $x^4 + 0x^3 - 17x^2 + 0x + 16$ $x^4 - 17x^2 + 16$ <table style="margin-left: 20px;"> <tr><td>1</td><td>0</td><td>-17</td><td>0</td><td>16</td></tr> <tr><td></td><td>↓</td><td>-4</td><td>16</td><td>-16</td></tr> <tr><td></td><td>1</td><td>-4</td><td>-1</td><td>4</td></tr> </table> <p style="text-align: right;">need missing terms</p> $x^3 - 4x^2 - x + 4$ | 1 | 0 | -17 | 0 | 16 |  | ↓ | -4 | 16 | -16 |  | 1 | -4 | -1 | 4 |
| 3   | 5  | -8  | 9  | 12  |    |  |   |  |  |  |  |    |    |    |  |  |   |   |    |     |   |   |   |     |   |    |  |   |    |    |     |  |   |    |    |   |
|   | ↓  |     |    |     |    |  |   |  |  |  |  |    |    |    |  |  |   |   |    |     |   |   |   |     |   |    |  |   |    |    |     |  |   |    |    |   |
|   | 15   | 21  | 90 |     |    |  |   |  |  |  |  |    |    |    |  |  |   |   |    |     |   |   |   |     |   |    |  |   |    |    |     |  |   |    |    |   |
|   | 5  | 7   | 30 | 102 |    |  |   |  |  |  |  |    |    |    |  |  |   |   |    |     |   |   |   |     |   |    |  |   |    |    |     |  |   |    |    |   |
| 1   | 0  | -17 | 0  | 16  |    |  |   |  |  |  |  |    |    |    |  |  |   |   |    |     |   |   |   |     |   |    |  |   |    |    |     |  |   |    |    |   |
|   | ↓  | -4  | 16 | -16 |    |  |   |  |  |  |  |    |    |    |  |  |   |   |    |     |   |   |   |     |   |    |  |   |    |    |     |  |   |    |    |   |
|   | 1  | -4  | -1 | 4   |    |  |   |  |  |  |  |    |    |    |  |  |   |   |    |     |   |   |   |     |   |    |  |   |    |    |     |  |   |    |    |   |
| <p>17. Solve the following polynomial equation by factoring. difference of squares</p> $x^4 - 81 \rightarrow (x^2 + 9)(x^2 - 9)$ $\sqrt{x^2} = \sqrt{-9} \quad \sqrt{x^2} = \sqrt{9}$ $ x = \pm 3i  \quad  x = \pm 3 $  | <p>18. Simplify. <math>(5 + 6i) + (2 - 7i)</math></p> $5 + 2 + 6i - 7i$ $7 - i$ <p style="text-align: right;">no remainder<br/>is a factor</p>   |     |    |     |    |  |   |  |  |  |  |    |    |    |  |  |   |   |    |     |   |   |   |     |   |    |  |   |    |    |     |  |   |    |    |   |

### Trigonometry



|   |  |  |
|---|--|--|
| What is the maximum?<br>$y = -1$  | What is the minimum?<br>$y = -3$                     | What is the amplitude?<br>$a = 1$  |
| What is the midline?<br>$k = -2$  | What is the period? (length of 1 cycle)<br>$8\pi$    | What is b?<br>$\text{period} = \frac{2\pi}{b} \rightarrow b = \frac{2\pi}{8\pi} = \frac{2}{8} = \frac{1}{4}$ |
| What is the domain?<br>$(-\infty, +\infty)$<br>What is the range?<br>$[-3, -1]$ | Is this Sine or Cosine?<br>cosine, starts at minimum | Write the Equation<br>$y = 1 \cos\left(\frac{1}{4}\theta\right) - 2$<br>$y = a \cos(b\theta) + k$            |

2. List the transformations

$$y = \frac{1}{3} \cos\left(\frac{1}{4}x\right) + 3$$

$\underbrace{\quad}_a \quad \underbrace{\quad}_b \quad \underbrace{\quad}_k$

Key

Vertical stretch or shrink (compression)? Shrink by how much?  $\frac{1}{3}$

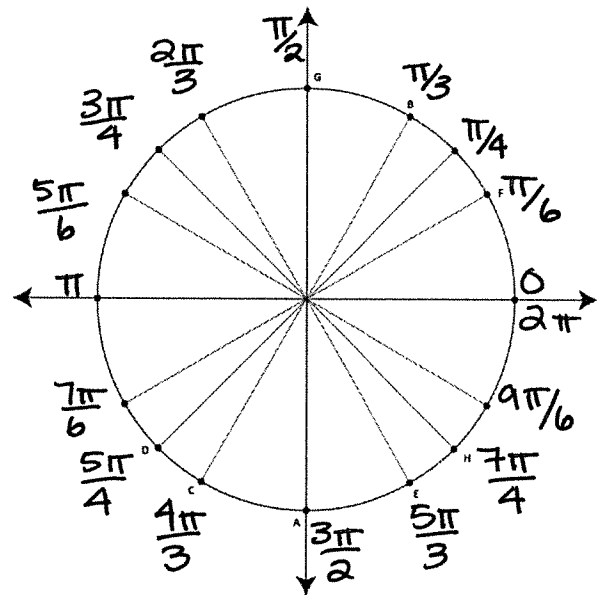
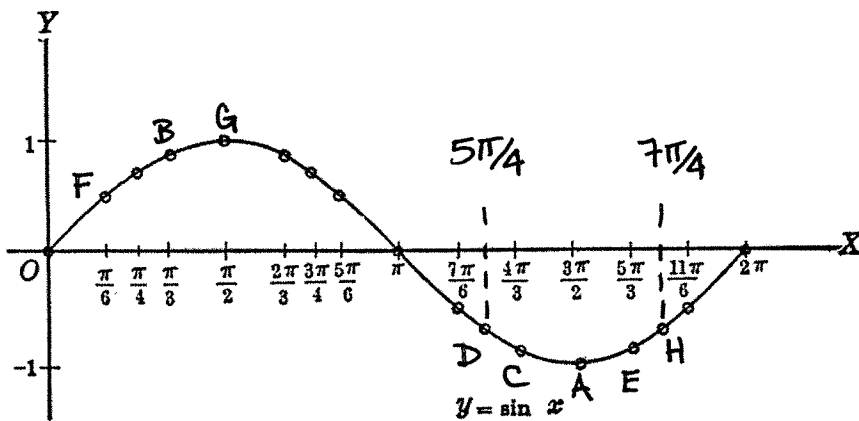
Horizontal stretch or shrink (compression)? stretch by how much?  $\frac{1}{4}$

Vertical shift up or down? up by how much? 3

What is the domain?  $(-\infty, +\infty)$  Range?  $[\frac{8}{3}, \frac{10}{3}]$

Is the graph reflected? no, a is not negative

3. Match each point on the unit circle to a point on the graph. Label the points on the graph (A - H).



$\sin = -$ ,  $\cos = -$ ,  $\tan = +$

4. If  $\sin\theta = \frac{-2}{9}$  in the 3<sup>rd</sup> quadrant what is  $\cos\theta = \frac{-\sqrt{77}}{9}$  what is  $\tan\theta = \frac{2\sqrt{77}}{77}$

\*Pythag. identity:  $\sin^2\theta + \cos^2\theta = 1$

\*  $\tan = \frac{y}{x} = \frac{\sin\theta}{\cos\theta}$

$$\left(\frac{-2}{9}\right)^2 + \cos^2\theta = 1$$

$$\tan\theta = \frac{-2/9}{-\sqrt{77}/9} = \frac{-2}{9} \cdot \frac{9}{\sqrt{77}}$$

$$\frac{4}{81} + \cos^2\theta = \frac{81}{81}$$

$$= \frac{2}{\sqrt{77}} \cdot \frac{\sqrt{77}}{\sqrt{77}} = \frac{2\sqrt{77}}{77}$$

$$-\frac{4}{81} \quad -\frac{4}{81}$$

$$\sqrt{\cos^2\theta} = \sqrt{\frac{77}{81}}$$

$$\cos\theta = \frac{-\sqrt{77}}{9}$$

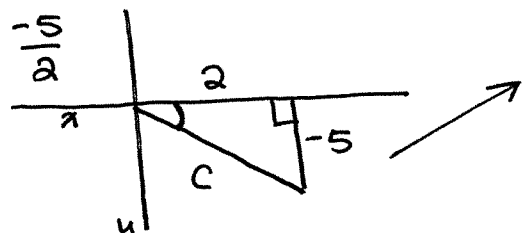
Key

5. If  $\cos\theta = \frac{-3}{5}$  in 2<sup>nd</sup> quadrant what is  $\sin\theta = \frac{4}{5}$  what is  $\tan\theta = \frac{-4}{3}$

$\sin = (+)$   
 $\tan = (-)$   
 $\cos^2\theta + \sin^2\theta = 1$   
 $(\frac{-3}{5})^2 + \sin^2\theta = 1$   
 $\frac{9}{25} + \sin^2\theta = \frac{25}{25}$   
 $-\frac{16}{25} \sqrt{\sin^2\theta} = \sqrt{\frac{16}{25}}$   
 $\sin\theta = +\frac{4}{5}$   
 $\tan = \frac{4}{\frac{-3}{5}} = \frac{4}{5} \cdot \frac{5}{-3} = \frac{-4}{3}$

6. If  $\tan\theta = \frac{-5}{2}$  in 4th quadrant what is  $\sin\theta = \frac{-5\sqrt{29}}{29}$  what is  $\cos\theta = \frac{2\sqrt{29}}{29}$

use:  
 $a^2 + b^2 = c^2$



$\tan = \frac{y}{x} = \frac{-5}{2}$   
 $2^2 + (-5)^2 = c^2$   
 $4 + 25 = c^2$  ★  
 $\sqrt{29} = \sqrt{c^2}$   
 $c = \sqrt{29}$   
 $\sin\theta = \frac{-5}{\sqrt{29}} \rightarrow \frac{-5\sqrt{29}}{29}$   
 $\cos\theta = \frac{2}{\sqrt{29}} = \frac{2\sqrt{29}}{29}$

Find the exact values of the following:

|  |   |   |  |
|--|---|---|--|
| <p>7. <math>\sin \frac{11\pi}{6} = -\frac{1}{2}</math><br/>         Q4 → <math>\sin = (-)</math><br/>         ref. angle = <math>30^\circ</math><br/> <math>\sin 30^\circ = \frac{1}{2}</math></p> | <p>8. <math>\cos \frac{5\pi}{6} = -\frac{\sqrt{3}}{2}</math><br/>         Q2 → <math>\cos = (-)</math><br/>         ref. angle = <math>30^\circ</math><br/> <math>\cos 30^\circ = \frac{\sqrt{3}}{2}</math></p> | <p>9. <math>\tan \frac{\pi}{2} = \frac{\pi}{2} = 90^\circ</math><br/> <math>(0, 1)</math><br/> <math>\tan = \frac{y}{x} = \frac{1}{0}</math><br/> <math>= \text{undefined}</math><br/>         * cannot divide by 0</p> | <p>10. <math>\tan \frac{4\pi}{3} = \sqrt{3}</math><br/>         Q3 → <math>\tan = (+)</math><br/>         ref. angle = <math>60^\circ</math><br/> <math>= \frac{-\sqrt{3}}{2} = -\frac{\sqrt{3}}{2} \cdot \frac{2}{1}</math></p> |
|--|---|---|--|

Convert from degrees to radians or radians to degrees.

|   |  |
|---|--|
| <p>11. <math>\frac{2\pi}{9} \times \frac{180^\circ}{\pi} = \frac{2 \cdot 180^\circ}{9} = \frac{2 \cdot 20^\circ}{1} = 40^\circ</math></p> | <p>12. <math>145^\circ \times \frac{\pi}{180^\circ} = \frac{145\pi}{180} = \frac{29\pi}{36}</math></p> |
|---|--|

Probability and Statistics

- Find  $P(\text{Disagree or Female})$  (intersects on table)  
 $\frac{135}{300} + \frac{180}{300} - \frac{105}{300} = \frac{210}{300} = \frac{7}{10}$
- Find  $P(\text{Agree or No Opinion})$  no intersection  
 $P(A) + P(N.O.) = \frac{80}{300} + \frac{25}{300} = \frac{105}{300} = \frac{7}{20}$
- Find the probability of a female given that she agrees.  
 $P(F|\text{agree}) = \frac{P(F \& \text{agree})}{\text{total agree}} = \frac{60}{140} = \frac{3}{7}$
- What is the probability of male and no-opinion?  
 $P(M \& \text{no op}) = \frac{10}{300} = \frac{1}{30} = \frac{\# \text{ males w/ no opinion}}{\text{total people}}$

|        | Agree | Disagree | No-opinion | Total |
|--------|-------|----------|------------|-------|
| Male   | 80    | 30       | 10         | 120   |
| Female | 60    | 105      | 15         | 180   |
| Total  | 140   | 135      | 25         | 300   |

Jackson has a bag of marbles. The bag contains 7 red, 3 blue, 6 purple, and 4 yellow.

$$\text{total marbles} = 7 + 3 + 6 + 4 = 20$$

5. What is the probability of Jackson pulling out 2 purple marbles? (He places the first one back after pulling out the first) (w/replacement)

$$P(2 \text{ purple}) = \frac{6}{20} \cdot \frac{6}{20} = \frac{36}{400} = \frac{9}{100}$$

6. What is the probability of Jackson pulling out 2 purple if the first marble was not replaced?

$$\begin{array}{cc} \text{1st pick} & \text{2nd pick} \\ \frac{6}{20} & \frac{5}{19} \end{array} \quad \frac{6}{20} \cdot \frac{5}{19} = \frac{30}{380} = \frac{3}{38}$$

9) The shoe sizes for a group of friends is shown.

6.5 7 7.5 7.5 8 8.5 9 9 9 9.5 9.5 (11 shoe sizes)

a) Find the mean and median.

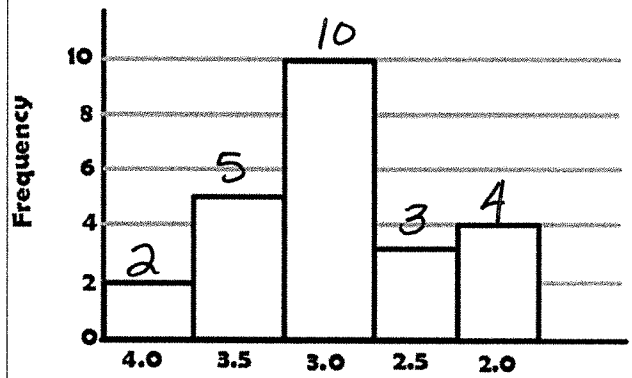
$$\text{mean} = 8.27 \quad \text{median} = 8.5$$

b) If the last person had a "growth spurt" and changed from a 9.5 to a 10; what would happen to the mean and median?

the mean would increase to 8.32 & the median will remain the same

Key

7. 24 total student GPA's



$$\text{Mean: } \frac{(2 \cdot 4) + (5 \cdot 3.5) + (10 \cdot 3) + (3 \cdot 2.5) + (4 \cdot 2)}{24} = 2.96$$

Median: 3.0 (12th & 13th terms are both 3.0, so the average of the two terms is 3.0)

Mode: 3.0

### Exponential/Logarithms

1. Interpret the parts of the exponential function below.

$$f(x) = 300(1.15)^t$$

300: initial value

1.15: indicates growth by 15%

$$1.15 - 1.00 = .15$$

$$\frac{.15}{1.00} \rightarrow 15\%$$

$$1.15 > 1 \Rightarrow \text{growth}$$

2. Interpret the parts of the exponential function below.

$$f(x) = 10,000(0.95)^t$$

10,000: initial value

0.95: indicates decay by 5%

$$1.00 - .95 = 0.05$$

$$\frac{.05}{1.00} = 5\%$$

$$.95 < 1 \Rightarrow \text{decay}$$