Name: SOLUTIONS

TICKET-IN-THE-DOOR

In order to be prepared for class you must watch the module and complete the following activity. This is due first thing when you get to class.

Define a power function. Power function is a function of the form $y=kx^p$

Check your understanding:

1. Is $y=x^4$ a power function? Yes because it's of the form $y=k\cdot x^p$
2. Is $y-25=(x-5)(x+5)$ a power function?
   $y-25=x^2-25 \Rightarrow y=x^2+0 \Rightarrow y=x^2$ is a power function.
3. Write the following in $f(x)=kx^p$
   a. $R(t)=\frac{4}{\sqrt{16t}}$ $=\frac{\cancel{4}}{\cancel{4}\sqrt{t}}=\frac{1}{\sqrt{t}}=t^{-1/2} \Rightarrow$ Power function

   b. $T(s)=(6s^{-2})(4s^{-3})$
   $T(s)=24s^{-5} \Rightarrow$ Power function.

   c. $K(w)=\frac{w^4}{4\sqrt{w^3}}$
   $K(w)=\frac{w^4}{4w^{3/2}}=\frac{1}{4}w^{4-\frac{3}{2}}=\frac{1}{4}w^{\frac{8}{2}-\frac{3}{2}}=\frac{1}{4}w^{\frac{5}{2}} \Rightarrow$ Power.

   d. $y=3\left(\frac{2}{5\sqrt{7x}}\right)^4$
   $y=3\left(\frac{16}{625\cdot 7^2\cdot x^2}\right)=\boxed{\frac{48}{30625}x^{-2}} \Rightarrow$ Power
4. Suppose y is directly proportional to x. If $y=1$ when $x=4$, what is the value of x when y is 5?

Sol: $y=k\cdot x$, $1=k(4)$ $\Rightarrow k=\frac{1}{4} \Rightarrow y=\frac{1}{4}\cdot x \Rightarrow 5=\frac{1}{4}\cdot x \Rightarrow \boxed{x=20}$

5. The volume occupied by a fixed quantity of gas such as oxygen is inversely proportional to its pressure, provided that its temperature is held constant. Suppose that a quantity of oxygen occupies a 60 liter volume at a pressure of 14 atmospheres. If the temperature of the oxygen does not change, how many liters will it occupy if its pressure rises to 19 atmospheres? Round to 1 decimal place.

Sol: $V=\frac{k}{P} \Rightarrow 60=\frac{k}{14} \Rightarrow k=840$

$V=\frac{840}{P}=\frac{840}{19}=\boxed{44.2105 \text{ liters}}$

Name: SOLUTION

TICKET-IN-THE-DOOR

In order to be prepared for class you must watch the module and complete the following activity. This is due first thing when you get to class.

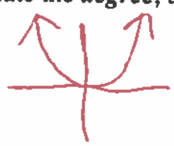
Define a polynomial function.

Check your understanding:

1. Thinking of the log-run behavior, state the ***degree***, and the end behavior of the graph.

   a. $y = 2x^2 - 3x + 7$

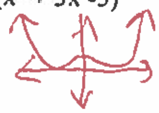
   Sol degree $= 2$

   END BEHAVIOR:
   graph rises to the left
   graph rises to the right
   i.e., as $x \to \infty$, $y \to \infty$
   as $x \to -\infty$, $y \to \infty$

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

   Sol $y = x^4 + \ldots$

   degree $= 4$

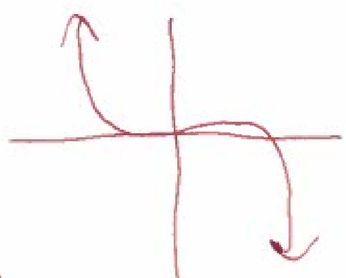
   c. $y = x^4 - 3x^3 - 2x + 1$

   Sol degree $= 4$
   (Same as part (b))

   END-BEHAVIOR:
   as $x \to \infty$, $y \to \infty$
   as $x \to -\infty$, $y \to \infty$

2. Let $f(x) = -2x^3 - 5x^2 + 8$. Which of the following statements are true?

   As $x \to \infty$, $f(x) \to -\infty$
   As $x \to \infty$, $f(x) \to \infty$
   As $x \to -\infty$, $f(x) \to -\infty$
   As $x \to -\infty$, $f(x) \to \infty$



graph rises to the left
graph falls to the right.

as $x \to \infty$, y or $f(x) \to -\infty$
as $x \to -\infty$, y or $f(x) \to \infty$

Name: SOLUTIONS.

TICKET-IN-THE-DOOR

In order to be prepared for class you must watch the module and complete the following activity. This is due first thing when you get to class.

State the *Zero Product Rule* If $a \cdot b = 0$, then $a = 0$ or $b = 0$.

Check your understanding:

1. Find the zeros of the following functions.

   a. $y = x^3 + 7x^2 + 12x$

   Sol $0 = x^3 + 7x^2 + 12x \Rightarrow x(x^2 + 7x + 12) = 0 \Rightarrow \boxed{x = 0}$ or $x^2 + 7x + 12 = 0$

   $(x+3)(x+4) = 0$

   $\boxed{x = -3 \text{ or } x = -4}$

   b. $y = (x^2 + 2x - 7)(x^3 + 4x^2 - 21x)$

   Sol $0 = x^2 + 2x - 7$

   $x = \frac{-2 \pm \sqrt{4 - 4(1)(-7)}}{2(a)}$

   $x = \frac{-2 \pm \sqrt{4 + 28}}{2}$ or

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

   $\boxed{x = -1 \pm 2\sqrt{2}}$

   $x^3 + 4x^2 - 21x = 0$

   $x(x^2 + 4x - 21) = 0$

   $x(x+7)(x-3) = 0$

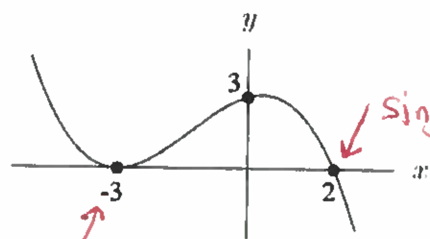
   $\boxed{x = 0}$ or $\boxed{x = -7}$ or $\boxed{x = 3}$

   c. $y = 5(x-2)(x^2-16)(x+5)$

   Sol $x - 2 = 0$ $\quad x^2 - 16 = 0$ $\quad x + 5 = 0$

   $\boxed{x = 2}$ $\quad \boxed{x = \pm 4}$ $\quad \boxed{x = -5}$

2. What could be a formula for the graph shown below



$f(x) = a(x+3)^2(x-2)$

$3 = a(0+3)^2(0-2)$

$3 = a(9)(-2)$

$3 = -18a$

$\boxed{a = -\frac{1}{6}}$

$\boxed{f(x) = -\frac{1}{6}(x+3)^2(x-2)}$

3. Find a possible formula for each polynomial with the given properties

   a. F has degree ≤ 2. $f(0) = 0$ and $f(1) = 1$

   Sol $f(x) = a(x)^2 \Rightarrow 1 = a(1)^2 \Rightarrow a = 1 \Rightarrow \boxed{f(x) = x^2}$

   b. F has degree ≤ 2. $f(0) = f(1) = f(2) = 1$

   Sol $f(0) = a(0)^2 + b(0) + c$

   $1 = c$

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

   $1 = a + b + 1$

   $1 = 4a + 2b + 1$

   $-2(a + b = 0)$

   $4a + 2b = 0$

   $-2a - 2b = 0$

   $4a + 2b = 0$

   $a = 0$

   $b = 0$

   $\Rightarrow \boxed{y = 1}$

   c. F is a third degree polynomial with $f(-3) = 0$, $f(1) = 0$, $f(4) = 0$ and $f(2) = 5$

   $f(x) = a(x - r_1)(x - r_2)(x - r_3)$

   $f(x) = a(x+3)(x-1)(x-4)$

   $5 = a(2+3)(2-1)(2-4)$

   $5 = a(5)(1)(-2)$

   $5 = -10a$

   $a = -\frac{1}{2}$

   $\boxed{f(x) = -\frac{1}{2}(x+3)(x-1)(x-4)}$