p.437–441 # S1–S10, 2–4, 7, 9–12, 14, 17, 18, 21, 22, 25, 26

S1.) $\sqrt{36t^2}$
$\sqrt{36}\sqrt{t^2}$
$\boxed{6|t|}$

S2.) $(3x\sqrt{x^3})^2$
$9x^2x^3$
$\boxed{9x^5}$

S3.) $(.1)^2(4xy^2)^2$
$.01(16x^2y^4)$
$\boxed{.16x^2y^4}$

S4.) $7(5w^{1/2})(2w^{1/3})$
$70w^{\frac{3}{6}} \cdot w^{\frac{2}{6}}$
$\boxed{70w^{\frac{5}{6}}}$

S5.) $\frac{10x^5}{x^2} = 2$
$10x^3 = 2$
$x^3 = \frac{2}{10}$
$x = \left(\frac{1}{5}\right)^{\frac{1}{3}}$
$\boxed{x = .585}$

S6.) $5x^{-2} = 500$
$x^{-2} = 100$
$\frac{1}{x^2} = \frac{100}{1}$
$100x^2 = 1$
$x^2 = \frac{1}{100}$
$\boxed{x = \pm\frac{1}{10}}$

S7.) $t^3 \cdot t^4 = t^{12}$
$\boxed{\text{FALSE}}$
$= t^7$

S8.) $(p^3)^8 = p^{11}$
$\boxed{\text{FALSE}}$
$= p^{24}$

S9.) $\frac{m^8}{2m^2} = \frac{1}{2}m^4$
$\boxed{\text{FALSE}}$
$= \frac{1}{2}m^6$

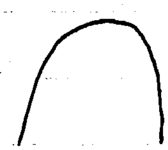
S10.) $5z^{-4} = \frac{1}{5z^4}$
$\boxed{\text{FALSE}}$
$= \frac{5}{z^4}$

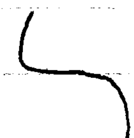
2.) $R(t) = \frac{4}{\sqrt{16t}}$
$= \frac{4}{\sqrt{16}\sqrt{t}} = \frac{4}{4\sqrt{t}}$
$= \frac{1}{\sqrt{t}} = \frac{1}{t^{\frac{1}{2}}}$
$\boxed{R(t) = t^{-\frac{1}{2}}}$

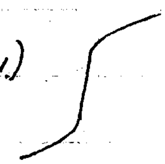
3.) $f(x) = 4(x+7)^2$
$\boxed{\text{NOT A POWER FUNCTION}}$
CAN'T BE WRITTEN $f(x) = Kx^p$

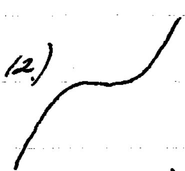
4.) $T(s) = (6s^{-2})(es^{-3})$
$\boxed{T(s) = 6es^{-5}}$

7.) $y = 3\left(\frac{2}{5\sqrt{7x}}\right)^4$
$= 3\left(\frac{16}{625(7^{\frac{1}{2}})^4(x^{\frac{1}{2}})^4}\right)$
$= \frac{48}{625(7^2)(x^2)}$
$= \frac{48x^{-2}}{625(49)}$
$\boxed{y = \frac{48}{30{,}625}x^{-2}}$
$\boxed{a = \frac{48}{30{,}625} \quad p = -2}$

9.)

U-SHAPED
$\boxed{\text{EVEN}}$

10.)

CHAIR-SHAPED
$\boxed{\text{ODD}}$

11.)

STEEPER NEAR ORIGIN, LESS STEEP AWAY
$\boxed{\text{FRACTIONAL}}$

12.)

CHAIR SHAPED SYMMETRIC ABOUT ORIGIN
$\boxed{\text{ODD}}$

14.) $(7,8)\ (1,.7)\quad y = Kx^p$
$.7 = K \cdot 1^p \rightarrow$ true for any value of p
so $K = .7$
$y = .7x^p$
$8 = .7(7)^p$
$\frac{8}{.7} = 7^p$
$\log\left(\frac{8}{.7}\right) = \log(7^p)$
$\log\left(\frac{8}{.7}\right) = p \cdot \log 7$
$\frac{\log\left(\frac{8}{.7}\right)}{\log 7} = p$
$p = 1.252$
$\boxed{y = .7x^{1.252}}$

15.) $f(1)=\frac{3}{2}$ $f(2)=\frac{3}{8}$

$y=Kx^P$

$\frac{3}{2}=K(1)^P$ $\left\{ 1^P = 1 \text{ ALWAYS} \right\}$

$\frac{3}{2}=K$

$\frac{3}{8}=\frac{3}{2}(2)^P$

$\frac{3}{8}\div\frac{3}{2}=2^P$

$\frac{3}{8}\cdot\frac{2}{3}=2^P$

$\frac{1}{4}=2^P$

$\log(\frac{1}{4})=\log 2^P$

$\frac{\log(\frac{1}{4})}{\log 2}=\frac{P\log 2}{\log 2}$

$-2=P$

$\boxed{y=\frac{3}{2}x^{-2}}$

17.) c is directly proportional to the square of d. c=45 when d=3. Find K and function $c=Kd^2$. Then find c when d=5.

$c=Kd^2$

$45=K(3)^2$

$45=9K$

$\boxed{5=K}$ → $\boxed{c=5d^2}$

$c=5(5)^2$

$=5(25)$

$\boxed{c=125}$

18.) c is inversely proportional to the square of d. c=45 when d=3. Find K and write formula. Find c when d=5.

$c=\frac{K}{d^2} \Rightarrow 45=\frac{K}{3^2} \Rightarrow 45\cdot3^2=K \Rightarrow \boxed{K=405}$

$\boxed{c=\frac{405}{d^2}}$ $c=\frac{405}{5^2}$ $c=\frac{405}{25}$ $\boxed{c=16.2}$

21.)

x	2	3	4	5
$f(x)$	12	27	48	75

TAKE RATIO OF ANY 2 VALUES

$\frac{f(3)}{f(2)}=\frac{K3^P}{K\cdot2^P}$

$\frac{27}{12}=\left(\frac{3}{2}\right)^P$

$\frac{9}{4}=\left(\frac{3}{2}\right)^P \rightarrow P=2$

$\log(\frac{9}{4})=\log(\frac{3}{2}^P)$

$\frac{\log(\frac{9}{4})}{\log(\frac{3}{2})}=\frac{P\log(\frac{3}{2})}{\log(\frac{3}{2})}$

$2=P$

$f(2)=12$

$12=K(2)^2$

$12=K\cdot4$

$3=K$

$\boxed{f(x)=3x^2}$

22.)

x	-6	-2	3	4
$g(x)$	36	4/3	-9/2	-32/3

$\frac{g(-2)}{g(-6)}=\frac{K(-2)^P}{K(-6)^P}$

$\frac{\frac{4}{3}}{36}=\left(\frac{1}{3}\right)^P$

$\frac{4}{3}\cdot\frac{1}{36}=\left(\frac{1}{3}\right)^P$

$\frac{1}{27}=\left(\frac{1}{3}\right)^P$

$\log(\frac{1}{27})=\log(\frac{1}{3}^P)$

$\frac{\log(\frac{1}{27})}{\log(\frac{1}{3})}=\frac{P\log(\frac{1}{3})}{\log(\frac{1}{3})}$

$3=P$

$g(-6)=36$

$36=K(-6)^3$

$36=K(-216)$

$K=\frac{36}{-216}$

$K=-\frac{1}{6}$

$\boxed{g(x)=-\frac{1}{6}x^3}$

25.) a.) $\lim_{x\to\infty} x^{-4}=\boxed{0}$

$\frac{1}{x^4}$ → approaches 0 as x gets larger

b.) $\lim_{x\to-\infty} 2x^{-1}=\boxed{0}$

$\frac{2}{x}$ approaches zero as x gets more negative

26.) a.) $\lim_{t\to\infty}(t^{-3}+2)$ $\boxed{2}$

$\frac{1}{t^3}+2$

approaches 2 as t gets larger

b.) $\lim_{y\to-\infty}(5-7y^{-2})$

$5-\frac{7}{y^2}=\boxed{5}$

approaches 5 a y gets more negative

29) $y = x^{-3}$ and $y = x^{\frac{1}{3}}$

describe behavior as:

a.) $x \to 0$ from right

$\boxed{y = \frac{1}{x^3} \to \infty}$

$\boxed{y = \sqrt[3]{x} \to 0}$

b.) $x \to \infty$

$\boxed{y = \frac{1}{x^3} \to 0}$

$\boxed{y = \sqrt[3]{x} \to \infty}$

32) a.) $\boxed{A = x^3 \quad B = x^2 \quad C = x^{\frac{3}{2}} \quad D = x \quad E = x^{\frac{1}{2}} \quad F = x^{\frac{1}{3}}}$

b.) $y = x^2$ and $y = x^3$ are concave up and $y = x^{\frac{1}{2}}$ and $y = x^{\frac{1}{3}}$ are concave down as they are inverses of each other and symmetric to $y = x$.

33.) LEAST TO GREATEST POWER: $\boxed{v, w, f, g}$ (v approaches 0 faster than w, g climbs faster than f)

34.) ODD POWER OF P: $\boxed{g, w}$ (Symmetry about origin)

38) 3 ounces contains 245 calories

DIRECTLY PROPORTIONAL - AS THE NUMBER OF OUNCES INCREASES, SO DOES THE NUMBER OF CALORIES

$c = kx$

$245 = k(3)$

$81\frac{2}{3} = k$

$\boxed{C = 81\frac{2}{3}x}$

$C = 81\frac{2}{3}(4)$

$\boxed{C = 326\frac{2}{3} \text{ calories}}$

41.) Pitch (P) is inversely proportional to square root of density (ρ).

$$\boxed{P = \frac{k}{\sqrt{\rho}} = k\rho^{\frac{1}{2}}}$$

43) 3.5 hours to drive LI to Albany at 55 mph

TIME IS INVERSELY PROPORTIONAL TO SPEED. AS THE SPEED INCREASES THE TIME DECREASES.

$T = \frac{k}{V}$

$3.5 = \frac{k}{55}$

$192.5 = k$

$\boxed{t = \frac{192.5}{V}}$

$3 = \frac{192.5}{V}$

$\frac{3}{1} = \frac{192.5}{V}$

$3V = 192.5$

$\boxed{V = 64.167 \text{ m/h}}$

46) radius of spill increases at 200 m/h.

a.) $\boxed{r = 200t}$

b.) $A = \pi r^2$

$= \pi(200t)^2$

$\boxed{A = 40000\pi t^2}$

c.) $A = 40000\pi(7)^2$

$= \boxed{6,157,521.601 \text{ m}^2}$