Review Problem Solutions:

3.4 1. $\pm 1, \pm 2, \pm \frac{1}{2}, \pm \frac{1}{3}, \pm \frac{1}{4}, \pm \frac{1}{6}, \pm \frac{1}{12}, \pm \frac{2}{3}$

2. a. None  b. 1 (twice), 2, -2  c. $-2, \frac{1}{2}, -\frac{1}{3}$

3.7. #3. $W(x) = \dfrac{x^4+2}{x-1}$  Zeros: $x^2+2=0$ No solutions; No $x$-intercepts

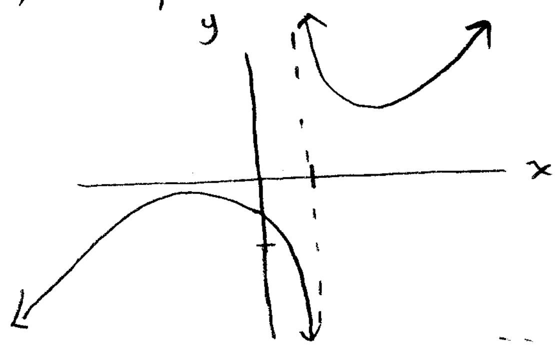
Vertical Asympote at $x=1$  As $x \to 1^-$, $W(x) \to -\infty$

As $x \to 1^+$, $W(x) \to +\infty$

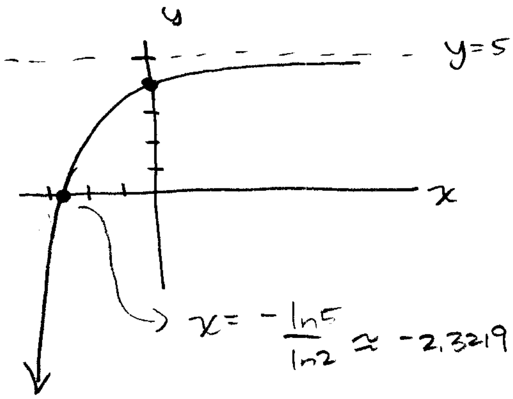
y-intercept: $W(0) = -2$

$(0,-2)$

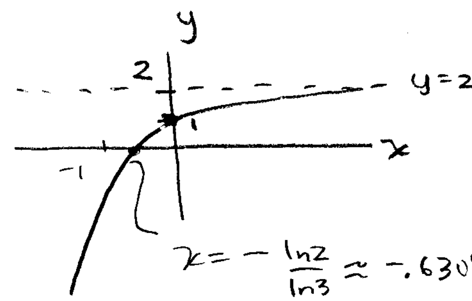
As $x \to +\infty$ and $x \to -\infty$, $W(x) \approx x^3$, this means as $x \to -\infty$, $W(x) \to -\infty$ and as $x \to +\infty$, $W(x) \to +\infty$.




4.1 # 1a. $y = -2^{-x} + 5$




4.1 1b. $y = -\left(\frac{1}{3}\right)^x + 2$




2. (i) $P = 2000$ $r = .05$  (a) $A(t) = 2000(1.05)^t$  (b) $A(t) = 2000(1.025)^{2t}$

(c) $A(t) = 2000(1.0125)^{4t}$  (d) $A(t) = 2000\left(1 + \frac{.05}{12}\right)^{12t}$  (e) $A(t) = 2000\left(1 + \frac{.05}{365}\right)^{365t}$

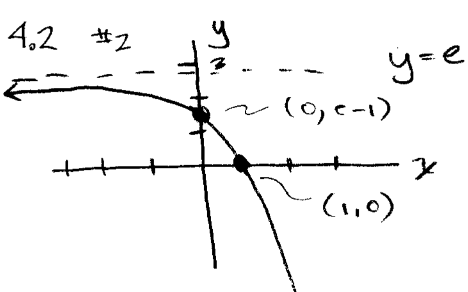
(ii) $A(1) = 2016.20 = 2000(1+r)$  OR  $I = Prt \Rightarrow 16.20 = 2000(r)(1)$

$2016.20 = 2000 + 2000r$  $r = \frac{16.20}{2000} = .0081 = .81\%$

$16.20 = 2000r$

$r = .81\%$

4.2 #2




$y = -e^x + e$

#3. $P = 10000$ $r = .011$

(a) $A(t) = 10000e^{.011t}$

$A(1) \approx \$10,110.61$

$A(2) \approx \$10,222.44$

$A(3.5) = \$10,392.51$

(b) $A(t) = 10,000\left(1 + \frac{.011}{4}\right)^{4t}$

$= 10,000(1.00275)^{4t}$

$A(1) = \$10,110.45$

$A(2) = \$10,222.13$

$A(3.5) = \$10,391.96$

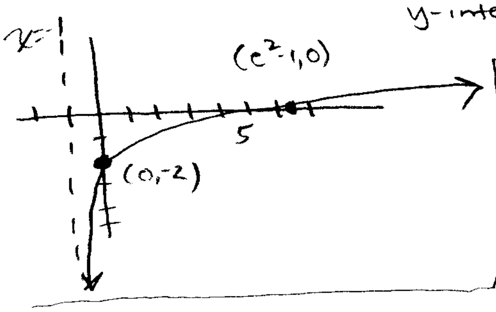
4.3: 1a. $2$ b. $-2$ c. $2$ d. $2x$ e. $1$ f. $\ln\pi$ g. $-1$ h. $1$ i. $x^2-1$ j. $0$ k. $100$

l. $1$ m. $2$ n. $200$ o. $4$ p. $\frac{3}{2}$ q. $\frac{-1}{2}$ r. $15$ s. $1$

2a. undefined b. positive c. negative d. negative e. positive $(=1)$

4. $y=\ln(x+1)-2$ domain: $x>-1$ range: $(-\infty,+\infty)$ x-intercept: $x=e^2-1\approx 6.39$

y-intercept: $y=-2$ Vertical asymptote: $x=-1$




5a. $1 < \log(76) < 2$ since $10<76<100$

b. $0 < \ln(\frac{1}{2}) < 1$ since $1 < \frac{1}{2} < e$

c. $3 < \log_4(70) < 4$ since $64 < 70 < 256$

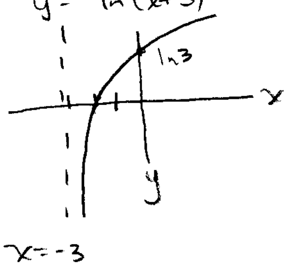
6. $P=10{,}000$, $A(t)=10{,}000e^{rt}$, $10{,}202.01 = 10{,}000e^{r(2)} \Rightarrow \frac{10{,}202.01}{10{,}000} = e^{2r} \Rightarrow$ (next line)

$\ln\left(\frac{10{,}202.01}{10{,}000}\right) = 2r$ or $r = \frac{1}{2}\ln\left(\frac{10{,}202.01}{10{,}000}\right) \approx .0099998$ or $1\%$

7. Change of base: $\log_a b = \frac{\log b}{\log a} = \frac{\ln b}{\ln a}$ a. $\approx 1.95$ b. $\approx -1.58$

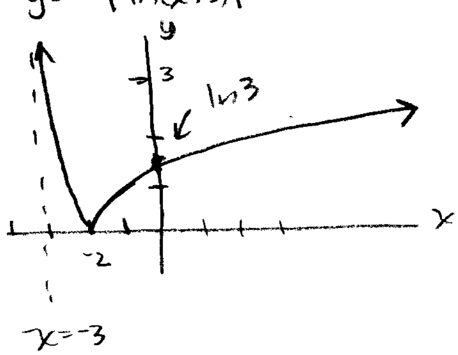
8. $\log(AB) = \log A + \log B$ $\log\left(\frac{A}{B}\right) = \log A - \log B$ $\log A^C = C\log A$

9. $y=\ln(x+3)$




so

$y=|\ln(x+3)|$




4.5: a. $-1.9$ b. $\pm\sqrt{10^3+1}$ c. $\frac{-1+\sqrt{1+4e^2}}{2}$ (Eliminate $\frac{-1-\sqrt{1+4e^2}}{2}$.) d. $\frac{5}{3}$

e. $x=\frac{1}{\sqrt{8}}=\frac{2\sqrt{2}}{8}$ f. $\ln 3$ g. $\frac{14\log(.1)}{\log(3)} = \frac{14(-1)}{\log(3)} = \frac{-14}{\log 3} \approx -29.34$

h. $2^{3x-1} = 3^{x+2} \Rightarrow (3x-1)\log 2 = (x+2)\log(3) \Rightarrow 3x\log(2) - x\log 3 = \log 2 + 2\log 3 \Rightarrow$ next line

$x(3\log 2 - \log 3) = \log 2 + 2\log 3$ or $x = \frac{(\log 2 + 2\log 3)}{3\log 2 - \log 3} \approx 2.95$

i. $x=4,-1$ j. Nonsense No Solutions.

4.5 continued

#3. $P=3000$ $r=.03$ Find $t$ when $A(t)=5000$. a. $t\approx 17.0913$ yrs b. $t\approx 17.0488$ yrs c. $t\approx 17.0275$ yrs.

4.6 1. This is Example 2, p. 341 2 See book

Section 10.2 #24 was supposed to be 25! The solution to 24 is $x=-1,\ y=-2,\ z=4$

10.9: $x^2+y^2<25$ and $x+2y\geq 5$ OR $y\geq -\frac{1}{2}x+\frac{5}{2}$ Example 2 p. 705