14.(g) $(2^x)(4^x) = 16^x$

$(2 \cdot 4)^x = 16^x$

$8^x = 16^x$

$2^{3x} = 2^{4x}$

$\Rightarrow 3x = 4x$

$\boxed{0 = x}$

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14(h) $5^{2x} - 4(5^x) + 3 = 0$

let $a = 5^x$

$a^2 - 4a + 3 = 0$

$(a-3)(a-1) = 0$

$a = 3$ $\qquad$ $a = 1$

$5^x = 3$ $\qquad$ $5^x = 1$

guess + check $\qquad$ $5^x = 5^0$

$x = 0$

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16. assume $q = 0$

$$P(t) = P_0 (2)^{t/D}$$

$$P(t) = 20 (2)^{t/15}$$

$$163840 = 20(2)^{t/15}$$

$$8192 = 2^{t/15}$$

$$2^{13} = 2^{t/15}$$

$$\Rightarrow \frac{t}{15} = 13$$

$$t = 195$$

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17. $m(t) = m_0 \left(\frac{1}{2}\right)^{t/h}$

$$m(t) = 50 \left(\frac{1}{2}\right)^{t/18.4}$$

$$10 = 50 \left(\frac{1}{2}\right)^{t/18.4}$$

$$\frac{1}{5} = \left(\frac{1}{2}\right)^{t/18.4}$$

need to find $\left(\frac{1}{2}\right)^x = \frac{1}{5}$

$$2^x = 5$$

guess+check $x \doteq 2.322$

$\left(\frac{1}{2}\right)^x = \left(\frac{1}{5}\right)$

$\frac{1^x}{2^x} = \frac{1}{5}$

$\frac{1}{2^x} = \frac{1}{5}$

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21. doubling → $a(2)^x$

↓ increase of 100%

100% + 100%

↑ original pop ↑ new addition

increase by 3% → 0.03

$P(t) = P_0(1.03)^t$

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p. 84 7(i) $\frac{a^0 + 3^2}{2^4 - 5^0} = \frac{1+9}{16-1}$

$= \frac{10}{15}$

$= \frac{2}{3}$

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p.84 3(j) $\frac{\cancel{3}^{1}ab^4}{\cancel{12}a^3b^2} \cdot \frac{\cancel{12}^{6}a^5b}{\cancel{15}_{5}a^4b}$

$= \frac{6}{5} \cdot \frac{a^6b^5}{a^7b^3}$

$= \frac{6}{5}a^{-1}b^2$ $\qquad a^{-1} = \frac{1}{a}$

$= \frac{6b^2}{5a}$

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11.1b1 $\left(\sqrt{2}\,x^{\frac{1}{2}}\right)^8$

$= \left(2^{\frac{1}{2}}x^{\frac{1}{2}}\right)^8 \longrightarrow \left((2x)^{\frac{1}{2}}\right)^8$

$= \left(2^{\frac{1}{2}}\right)^8\left(x^{\frac{1}{2}}\right)^8 \qquad = (2x)^4$

$= 2^4x^4 \qquad = 16x^4$

$= 16x^4$

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11(h) $\left(\frac{-8}{27}\right)^{-\frac{2}{3}}$

$\left(\frac{a}{b}\right)^{-x} = \left(\frac{b}{a}\right)^{x}$

$= \left(-\frac{27}{8}\right)^{\frac{2}{3}}$

$= \left(\sqrt[3]{-\frac{27}{8}}\right)^{2}$ OR $\sqrt[3]{\left(-\frac{27}{8}\right)^{2}}$

$= \left(-\frac{3}{2}\right)^{2}$ $= \sqrt[3]{\frac{729}{64}}$

$= \frac{9}{4}$ $= \frac{9}{4}$

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p. 86 #8

$\ell = \left(\frac{5}{2}\right)^{-\frac{2}{3}}$

$V = \ell^{3}$

$= \left(\left(\frac{5}{2}\right)^{-\frac{2}{3}}\right)^{3}$

$= \left(\frac{5}{2}\right)^{-2}$

$= \left(\frac{2}{5}\right)^{2}$

$= \frac{4}{25}$

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21. Let 1950 be $t=0$

$P(0) = 45000$

(a) $P(t) = P_0 (1.03)^t$

$P(t) = 45000 (1.03)^t$

(b) in 2007, $t = 17$

$P(17) = 45000 (1.03)^{17}$

$=$ _____

(c) $P(t) = 90000$, $t = ?$

$90000 = 45000 (1.03)^t$

$2 = 1.03^t$

guess & check

(d) Suppose $t=10$ is doubling

$90000 = 45000 (b)^{10}$

$2 = b^{10}$

$\sqrt[10]{2} = b$

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p. 86 # 11(b)

$3^{g+3} - 3^{g+2} = 1458$

$3^g \cdot 3^3 - 3^g \cdot 3^2 = 1458$

$3^g (3^3 - 3^2) = 1458$

$3^g (27 - 9) = 1458$

$3^g = \frac{1458}{16}$

$3^g = 91.125$ guess + check

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22. $M = 45(1.012)^{-t}$

(a) $M_0 = 45$

(b) set $t = 50$

(c)

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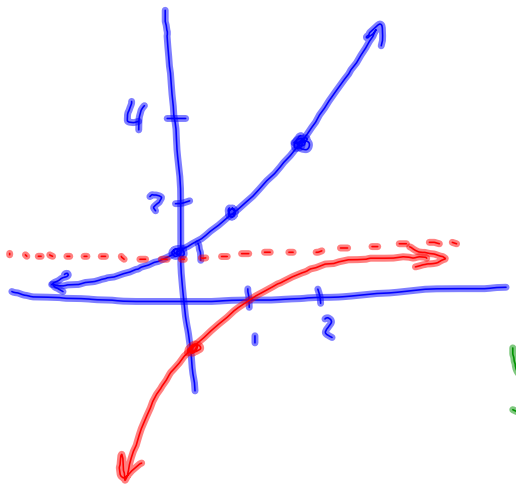
7. $y = -2f(-x) + 1$

v. reflect
v. stretch × 2
h. reflect
v. shift up 1

(i) $f(x) = 2^x$



$y = -2(2^{-x}) + 1$

$y = -2(2^{-x}) + 1$

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