121 §4.1 II #s 63, 64, 65, 69, 79, 85, 89, 103, 105, 113

#s 63-80 Solve each Eq'n.

2|64
2|32
2|16
2|8
2|4
2|2
2^6 ✓

(63) $2^x = 64$

$2^x = 2^6$

$\boxed{x = 6}$

(64) $5^x = 1 = 5^0$

$\boxed{x = 0}$

(65) $10^x = .1 = \frac{1}{10} = 10^{-1}$

$\boxed{x = -1}$

(69) $3^{-x} = 9 = 3^2$

$-x = 2$

$\boxed{x = -2}$

(79) $2 \cdot 2^{2x} = 4^x + 64$

$2 \cdot (2^2)^x = 4^x + 64$

$2 \cdot 4^x = 4^x + 64$

$2 \cdot 4^x - 4^x = 64$

$4^x = 64 = 4^3$

$x = 3$

As powers of 4

$2 \cdot 2^{2x} = (2^2)^x + 64$

$2 \cdot 2^{2x} = 2^{2x} + 64$

$2 \cdot 2^{2x} - 2^{2x} = 64$

$2^{2x} = 64$

$2^{2x} = 2^6$

$2x = 6$

$x = 3$

As powers of 2

#s 81-96 Let $f(x) = 2^x$, $g(x) = \left(\frac{1}{3}\right)^x$, $h(x) = 10^x$ & $m(x) = e^x$. Find x.

(85) $g(x) = 1$

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

$\boxed{x = 0}$

(89) $h(x) = 1000$

$10^x = 1000 = 10^3$

$\boxed{x = 3}$

2|1000
2|500
2|250
5|125
5|25
5

$1000 = 2^3 \cdot 5^3 = (2 \cdot 5)^3 = 10^3$ ✓

121 §4.1 II #s 103, 105, 113

(103) $P = \$5000$ and $r = 8\%$ APR. Find amt A @ end of 6 yrs and the interest, if interest is compounded...

(a) Annually: $A = P\left(1 + \frac{r}{m}\right)^{mt}$

$= 5000\left(1 + \frac{.08}{1}\right)^{1 \cdot 6} = 5000(1 + .08)^6 \approx$

Interest $\approx$ $-5000 \approx$

(b) Quarterly:

$A = 5000\left(1 + \frac{.08}{4}\right)^{4 \cdot 6} \approx$

Interest $\approx$ $-5000 =$

(c) Monthly:

$A = 5000\left(1 + \frac{.08}{12}\right)^{12 \cdot 6} \approx$

Interest $\approx$ $-5000 \approx$

(d) Daily:

$A = 5000\left(1 + \frac{.08}{365}\right)^{365 \cdot 6} \approx$

Interest $\approx$ $-5000 =$

121 § 4.1 II #s 103, 105, 113

(103) $P = \$5000$ and $r = 8\%$ APR. Find amt A @ end of 6 yrs and the interest, if interest is compounded...

(a) Annually: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

$= 5000\left(1 + \frac{.08}{1}\right)^{1 \cdot 6} = 5000(1 + .08)^6 \approx \$7934.37$

Interest $\approx 7934.37 - 5000 = \$2934.37$

(b) Quarterly:

$A = 5000\left(1 + \frac{.08}{4}\right)^{4 \cdot 6} \approx \$8042.19$

Interest $\approx 8042.19 - 5000 = \$3042.19$

(c) Monthly:

$A = 5000\left(1 + \frac{.08}{12}\right)^{12 \cdot 6} \approx \$8067.51$

Interest $\approx 8067.51 - 5000 = \$3067.51$

(d) Daily:

$A = 5000\left(1 + \frac{.08}{365}\right)^{365 \cdot 6} \approx \$8079.95$

Interest $\approx 8079.95 - 5000 = \$3079.95$

§ 4.1 IT #s 105, 113

(105) $P = 5000$, $r = .08$, but compounded CONTINUOUSLY

for $t = \ldots$

(a) 6 years: $A = Pe^{rt} = 5000e^{(.08)(6)}$

$\approx$ \$8080.37

(b) 8 yrs, 3 months:

$3 \text{ mos} = (3 \text{ mos})\left(\frac{1 \text{ yr}}{12 \text{ mos}}\right) = \frac{3}{12} \text{ yr} = .25 \text{ yr}$

$A = Pe^{rt} = 5000e^{(.08)(8.25)} \approx$ \$9673.96

(c) 5 yrs, 4 mos, 22 days

$4 \text{ mos} = \frac{1}{3} \text{ yr} = .\overline{3} = .333\ldots \text{ yr}$

$22 \text{ days} = \frac{22}{365} \text{ yr} \approx .060273972\overline{6} \text{ yr}$

$A = Pe^{rt} \approx 5000e^{(.08)(5.393607305\overline{9})} \approx$ \$7697.74

(113) $A = 200e^{-.001t}$ models decay of 200g of radioactive substance.

There are 200 g present @ $t = 0$ yrs

There are $200e^{(-.001)(500)} \approx 121.3061319$ g present @ $t = 500$ yrs