Classwork 10, MATH 1113 Harrison Chapman Name: Key

8:00 or 9:30

1. Find an exponential function of the form $f(x) = ba^x$ that has y-intercept 16 and passes through the point $P(2,1)$.

(B) (A)

A $16 = ba^0$

$16 = b.$

B $1 = ba^2$

$1 = 16a^2$

$\frac{1}{16} = a^2$

$\sqrt{\frac{1}{16}} = a$

So $f(x) = 16\left(\sqrt{\frac{1}{16}}\right)^x$

2. Solve the equation:

$$A\ 16^{7x}\left(\frac{1}{4}\right)^{10x+7} = 64\left(4^x\right)^{-10}$$

(B) (C) (D)

All powers of 4.

(A) $16^{7x} = (4^2)^{7x} = 4^{14x}$

(B) $\left(\frac{1}{4}\right)^{10x+7} = (4^{-1})^{10x+7} = 4^{-10x-7}$

(C) $64 = 4^3$

(D) $(4^x)^{-10} = 4^{-10x}$

So $(4^{14x})(4^{-10x-7}) = (4^3)(4^{-10x})$

$4^{14x-10x-7} = 4^{3-10x}$

$14x - 10x - 7 = 3 - 10x$

$14x = 10$

$x = \frac{5}{7}.$

3. Find the zeros of $f(x) = x^3\left(5e^{5x}\right) + 3x^2e^{5x}$.

$0 = x^3(5e^{5x}) + 3x^2e^{5x}$

$0 = x^2(x \cdot 5e^{5x} + 3e^{5x})$

So $x^2 = 0$ or $0 = x \cdot 5e^{5x} + 3e^{5x}$

$x = 0$ or $0 = (5x+3)e^{5x}$

so $e^{5x} = 0$ never! or $0 = 5x + 3$, $-3 = 5x$, $-\frac{3}{5} = x$

$x = -\frac{3}{5}, 0$

4. Suppose $1000 is invested at a rate of 13% per year compounded monthly.

a) Find the principal after 1 month.

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

$A = 1000\left(1 + \frac{0.13}{12}\right)^{12t}$

$A\left(\frac{1}{12}\right) = 1010.83$

b) Find the principal after 6 months.

$A\left(\frac{1}{2}\right) = 1066.79$

c) Find the principal after 1 year.

$A(1) = 1138.03$

d) Find the principal after 20 years.

$A(20) = 13276.79$

5. Assume that interest is compounded quarterly at a nominal rate of 6%. An investor wants an investment to be worth $18,000 after 9.25 years. Determine the amount the investor must now invest.

$A = 18000$, $n = 4$, $r = 0.06$

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

$18000 = P\left(1 + \frac{0.06}{4}\right)^{4(9.25)}$

$P = \frac{18000}{\left(1 + \frac{0.06}{4}\right)^{4(9.25)}}$

6. How much money, invested at an interest rate of 6.2% per year compounded continuously, will amount to $100,000 after 10 years?

$A = Pe^{rt}$

$100000 = Pe^{0.062(10)}$

$P = 100000 / e^{0.062(10)}$

$P \approx 53794.443759$