

Math 120
Exam #4
Summer '10

Name:

1. 10 pts. Use synthetic division to perform the division: $\frac{x^5 + 3x^4 + 2x^3 + 2x^2 + 3x + 1}{x + 2}$
2. Consider the polynomial function f defined by $f(x) = 8x^4 - 14x^3 - 29x^2 - 4x + 3$.
 - (a) 5 pts. Applying the Rational Zeros Theorem, list the possible rational zeros of the function.
 - (b) 10 pts. Find all rational zeros of the function f .
 - (c) 5 pts. Fully factor the polynomial $f(x)$.
3. 10 pts. Find a polynomial function f of degree 3 with -2 , 1 , and 4 as zeros, and $f(2) = 16$
4. 10 pts. Find a polynomial function of least degree with real coefficients and having 3 and $2 + i$ as zeros.
5. 10 pts. each Solve each equation.
 - (a) $16^{2x-1} = 64^{3x}$
 - (b) $z^{4/3} = 81$
 - (c) $x = \log_8 \sqrt[4]{8}$
 - (d) $\log_x 3 = -1$
6. 10 pts. each Solve each equation. When solutions are irrational, give them as decimals correct to four decimal places.
 - (a) $6^{2x-2} = 12^{1-x}$
 - (b) $500(1.05)^{x/4} = 200$
 - (c) $\ln(3x + 8) = \ln(18)$
 - (d) $\log_2 x + \log_2(x + 2) = 3$
 - (e) $\ln[\ln(e^{-x})] = 3$
7. 10 pts. each The amount of radioactive material, in grams, present after t days is modeled by $A(t) = 500e^{-0.0012t}$.
 - (a) Find the amount present after three weeks.
 - (b) Find the half-life of the material.
8. 15 pts. Cobra Commander has 200 grams of a radioactive isotope in the basement of his secret hideout. Upon returning from a carefree 4-hour drive with Destro in the countryside in his spiffy new Nissan Cube, he finds that 192 grams remain. At what time will only 20 grams remain?
9. 15 pts. If interest is compounded quarterly, what must the annual interest rate of an investment be in order for the investment to double in value in a mere 3 years? What if the interest is compounded continuously?

EXTRA CREDIT (15 pts.) Solve the system of equations by any method given in Section 5.1 of the text.

$$\begin{cases} 4x - y + 3z = -2 \\ 3x + 5y - z = 15 \\ -2x + y + 4z = 14 \end{cases}$$