

MAT 142 homework #2 Key

$$1a. (x+1)(10x^2-7x-6) = (x+1)(5x-6)(2x+1)$$

$$b. 7x^4 + 34x^2 - 5 = (7x^2-1)(x^2+5)$$

$$c. (x-y)^2 [(x-y)^2 - 4] = (x-y)^2 [x-y-2][x-y+2]$$

$$d. 3x^2 + 5xy^2 + 2y^4 = (3x+2y^2)(x+y^2)$$

$$e. -8(4x+3)^{-2} + 10(5x+1)(4x+3)^{-1} = \frac{-8 + 10(5x+1)(4x+3)}{(4x+3)^2}$$

$$\frac{-8 + 10(20x^2 + 15x + 4x + 3)}{(4x+3)^2} = \frac{-8 + 200x^2 + 190x + 30}{(4x+3)^2} = \frac{200x^2 + 190x + 22}{(4x+3)^2}$$

$$\frac{2(100x^2 + 95x + 11)}{(4x+3)^2}$$

$$f. x^{3/2} - x^{1/2} = x^{1/2}(x-1)$$

$$g. 12x^{-3/4} + 6x^{1/4} = 6x^{-3/4}(2+x)$$

$$h. (x^2+3)^{-2/3} + (x^2+3)^{-5/3} = (x^2+3)^{-5/3} [x^2+3+1] = (x^2+3)^{-5/3} (x^2+4)$$

$$i. y^5 - 81y = y(y^4 - 81) = y(y^2+9)(y^2-9) = y(y^2+9)(y-3)(y+3)$$

$$j. x^2 - 12x + 36 - 49y^2 = (x-6)^2 - 49y^2 = [(x-6)-7y][(x-6)+7y]$$

$$k. x^3 + 2x^2 - 4x - 8 = x^2(x+2) - 4(x+2) = (x+2)(x^2-4) = (x+2)^2(x-2)$$

$$l. x^2 + 64 \text{ prime}$$

$$m. 64x^3 + 27 = (4x+3)(16x^2 - 12x + 9)$$

$$n. x^3 - 27 = (x-3)(x^2 + 3x + 9)$$

$$o. (x^2+4)^{3/4} + (x^2+4)^{7/2} = (x^2+4)^{3/2} [1 + (x^2+4)^2] = (x^2+4)^{3/2} [x^4 + 8x^2 + 17]$$

$$p. (4x-1)^{3/2} - \frac{1}{3}(4x-1)^{5/2} = \frac{1}{3}(4x-1)^{3/2} [3 - (4x-1)] = \frac{1}{3}(4x-1)^{3/2} [4-4x]$$

2. a. $a_0 = -1, a_1 = 3, a_2 = 7, a_3 = 11, a_4 = 15, a_5 = 19$

b. $a_0 = -4, a_1 = +5, a_2 = -6, a_3 = 7, a_4 = -8, a_5 = 9$

c. $a_0 = \frac{1}{2}, a_1 = \frac{-1}{3}, a_2 = \frac{1}{5}, a_3 = \frac{-1}{7}, a_4 = \frac{1}{11}, a_5 = \frac{-1}{17}$

d. $a_1 = 4, a_2 = 11, a_3 = 25, a_4 = 53, a_5 = 109$

e. $a_1 = \frac{2}{1}, a_2 = \frac{6}{4}, a_3 = \frac{24}{9}, a_4 = \frac{120}{16}, a_5 = \frac{720}{25}$

$n=0$ not defined

f. $a_0 = 1, a_1 = -3, a_2 = 9, a_3 = -27, a_4 = 81, a_5 = -243$

g. $a_0 = 0, a_1 = \frac{3}{6}, a_2 = \frac{6}{7}, a_3 = \frac{9}{8}, a_4 = \frac{12}{9}, a_5 = \frac{15}{10}$

h. $a_1 = 7, a_2 = 12, a_3 = 17, a_4 = 22, a_5 = 27$

i. $a_0 = 0, a_1 = 1, a_2 = \frac{4}{2}, a_3 = \frac{9}{6}, a_4 = \frac{16}{24}, a_5 = \frac{25}{120}$

3 a. $\sum_{i=1}^6 5i = 5 + 10 + 15 + 20 + 25 + 30 = 105$

b. $\sum_{i=2}^4 \left(-\frac{1}{3}\right)^i = \frac{1}{9} - \frac{1}{27} + \frac{1}{81} = \frac{7}{81}$

c. $\sum_{i=1}^5 i^3 = 1 + 8 + 27 + 64 + 125 = 225$

d. $\sum_{i=0}^4 \frac{(-1)^{i+1}}{(i+1)!} = -\frac{1}{1} + \frac{1}{2} - \frac{1}{6} + \frac{1}{24} - \frac{1}{120} = -\frac{19}{30}$

4. a. $\sum_{i=1}^{15} i^2$

b. $\sum_{n=1}^{14} \frac{n}{n+1}$

c. $\sum_{n=0}^{13} 2n+5$

d. $\sum_{n=1}^4 2^n$

e. $\sum_{i=1}^n \left(\frac{1}{9}\right)^i$

5. a. $\sum_{i=0}^{\infty} 5(3)^{i-1}$ 5, 15, 45, 105, 315, ...

b. $\sum_{i=1}^{\infty} 24\left(\frac{1}{3}\right)^{i-1}$ 24, 8, $\frac{8}{3}$, $\frac{8}{9}$, $\frac{8}{27}$, ...

c. $\sum_{n=1}^{\infty} -6(-5)^{n-1}$ -6, 30, -150, 750, -3750, ...

d. $\sum_{n=1}^{\infty} 1000\left(-\frac{1}{2}\right)^{n-1}$ 1000, -500, 250, -125, 62.5, ...

6. a. $\sum_{i=0}^8 3(4)^i$ b. $\sum_{i=0}^{\infty} 5(-\frac{1}{5})^i$ c. $\sum_{i=0}^{\infty} 12(\frac{1}{2})^i$

7. $\sum_{i=0}^{\infty} -\frac{3}{2}(-2)^i = \sum_{i=0}^{\infty} -\frac{3}{2}(-2)^i = \frac{-\frac{3}{2}[1 - (-2)^{14}]}{1 - (-2)} = \frac{-\frac{3}{2}[1 - 16384]}{1+2}$

8. a. $\sum_{i=1}^8 3^i = 3+9+27+81+243+729+2187+6561 = 9840$

b. $\sum_{i=1}^5 8(-.03)^{i-1} = \frac{8}{1 - (-0.03)} = 7.76699$

c. $\sum_{i=1}^5 3(-\frac{1}{3})^{i-1} = \frac{3}{1 - (-\frac{1}{3})} = \frac{9}{4}$

d. $\sum_{i=1}^6 (\frac{1}{3})^{i+1} = \frac{1}{9} + \frac{1}{27} + \frac{1}{81} + \frac{1}{243} + \frac{1}{729} + \frac{1}{2187} = \frac{364}{2187}$

e. $\sum_{i=1}^{\infty} 12(-.7)^{i-1} = \frac{12}{1 - 0.7} = 11.21495$

f. $\sum_{i=1}^{\infty} 3(\frac{1}{4})^{i-1} = \frac{3}{1 - \frac{1}{4}} = 4$

9. a. $a_n = n+5$ yes, it's arithmetic
 b. $a_n = (\frac{1}{2})^n$ yes, it's geometric
 c. $a_n = n^2 - 3$ no, it's neither

10. $\sum_{i=1}^{10} 16(.96)^{i-1} = \frac{16[1 - .96^{10}]}{1 - .96} = 134.07$ inches

11. $\sum_{i=1}^{480} 50(1.00458\bar{3})^{i-1} = \frac{50(1 - (1.00458\bar{3})^{480})}{1 - 1.00458\bar{3}} = 87,051.98$
 at age 65

50 x 480 = 24,000 deposited

87,051.98
 - 24,000.00

 63,051.98 is interest