

## MAT 142 homework #2 Key

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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, ...