

Simplify.

1)  $(4i) - (3 - 6i) - 6$   
 $-9 + 10i$

3)  $(1 - 2i) + 4 + (8i)$   
 $5 + 6i$

5)  $(-1 + 2i) + (-7 - 5i)$   
 $-8 - 3i$

7)  $(-3 - 5i)(3 + 4i)$   
 $11 - 27i$

9)  $(-4 + 6i)(5 + 6i)$   
 $-56 + 6i$

11)  $(6 + 4i)^2$   
 $20 + 48i$

13)  $\frac{3i}{8 - 8i}$

$$\frac{-24 + 24i}{128}$$

15)  $\frac{3 + 8i}{4 - 8i}$

$$\frac{-13 + 14i}{20}$$

17)  $(2i)(-5 + i)$   
 $-2 - 10i$

19)  $(-4 + 4i)(-1 + 3i)(2 + 3i)$   
 $32 - 52i$

2)  $(-5 - i) - (4 - 6i)$   
 $-9 + 5i$

4)  $(-6 - 2i) + (-2 + 3i)$   
 $-8 + i$

6)  $7(5i)(-3 - 3i)$   
 $105 - 105i$

8)  $(-4 - 3i)^2$   
 $7 + 24i$

10)  $(1 - 5i)(8 - 2i)$   
 $-2 - 42i$

12)  $(-1 - 5i)(-3 + i)$   
 $8 + 14i$

14)  $\frac{9}{10 - 3i}$   $\frac{90 + 27i}{109}$

16)  $\frac{2 - 5i}{10 - 2i}$   $\frac{15 - 23i}{52}$

18)  $(-6 + 2i)(-5 - 2i)(-4 + 6i)$   
 $-148 + 196i$

Describe the end behavior of each function. Use arrows to show directions of each end.

20)  $f(x) = -x^4 + x^2 + x + 4$

↓↓

21)  $f(x) = -x^3 + 4x^2 - 2$

↑↓

22)  $f(x) = 2x^2 + 4x + 1$

↑↑

23)  $f(x) = x^3 - 3x^2 - 1$

↓↑

State the Degree, and the number of turns the graph could have.

24)  $f(x) = -x^4 + 4x^2 + 2x - 4$

Deg: 4  
# of turns: 3

25)  $f(x) = -x^3 + x^2 + 1$

Deg: 3  
# of turns: 2

State the number of complex roots for each equation.

26)  $(x-1)(x-11)(x+1)$

$x = 1, 11, -1$

27)  $x^2(x+7)(x+1)$

$x = 0, -7, -1$

28)  $x(x-1)^2(x-5)$

$x = 0, 1, 5$

29)  $x(x-2)(x+1)^2$

$x = 0, 2, -1$

30)  $x(x-1)^2(x-3)$

$x = 0, 1, 3$

31)  $(x-11)(x+1)^2$

$x = 11, -1$

Given the following polynomial in factored form, state the Degree, the Roots, the x & y-intercepts, the End Behavior, and the curve at each root.

32)  $x(x-11)(x-1)^2$  Deg: 4  $\uparrow\uparrow$   
 X int: 0, 11, 1  $\leftrightarrow$  Roots: 0, 11, 1  
 Y int: 0  
 0:  $\nearrow$   
 11:  $\nwarrow$   
 1:  $\cup$

33)  $(x+5)(x+1)(x-1)$  Deg: 4  $\uparrow\uparrow$   
 X int: -5, -1, 1  
 Y int: -5  
 Roots: -5, -1, 1  
 -5:  $\nwarrow$   
 -1:  $\cup$   
 1:  $\nwarrow$

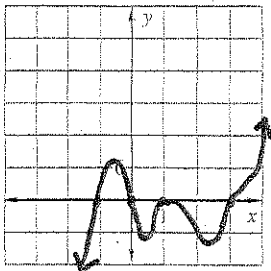
34)  $x(x+7)(x+1)(x-1)^2$  Deg: 7  
 X-int: 0, -7, -1, 1  
 Y-int: 0  
 0:  $\nwarrow$   
 -7:  $\nwarrow$   
 -1:  $\cup$   
 1:  $\cup$

35)  $x^2(x+1)(x+2)^2$  Deg: 5  
 X-int: 0, -1, -2  
 Y-int: 0  
 Roots: 0, -1, -2  
 0:  $\cup$   
 -1:  $\nwarrow$   
 -2:  $\cup$

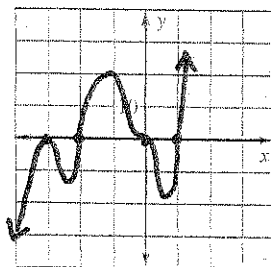
36)  $x(x+5)(x+1)^2$  Deg: 4  
 X-int: 0, -5, -1  
 Y-int: 0  
 Roots: 0, -5, -1  
 0:  $\nwarrow$   
 -5:  $\nwarrow$   
 -1:  $\cup$

37)  $x(x+1)^2(x+3)^3$   
 X-int: 0, -1, -3  
 Y-int: 0  
 Deg: 6<sup>th</sup>  
 Roots: 0, -1, -3  
 0:  $\nwarrow$   
 -1:  $\cup$   
 -3:  $\nwarrow$

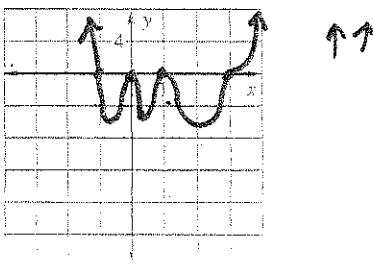
38.  $g(x) = x(x+1)(x-1)^2(x-3)^3$



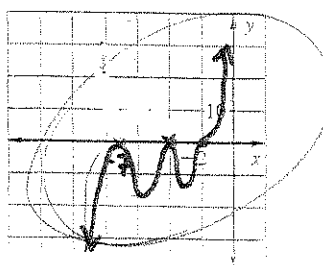
39.  $f(x) = x^3(x+3)^2(x^2+x-2)$   
 $(x+2)(x-1)$



40.  $f(x) = x^2(x+1)(x-1)^2(x-3)^3$

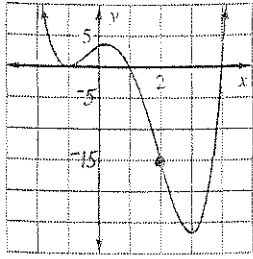


41.  $g(x) = (x+7)^2(x+4)^2(x+2)^3$



Write the polynomial of least degree from the following graphs.  
 (Remember to find "a") Write in Standard Form.

42.



$$-15 = a(x+1)^2(x-1)(x-4)$$

$$-15 = a(2+1)^2(2-1)(2-4)$$

$$-15 = a(3)^2(1)(-2)$$

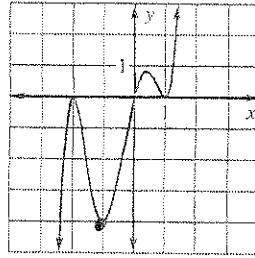
$$-15 = -18a$$

$$\frac{15}{18} = a$$

$$.8\bar{3} = a$$

$$\underline{y = .8\bar{3}(x+1)^2(x-1)(x-4)}$$

43.



$$-4 = a(x+2)^2(x)(x-1)^2$$

$$-4 = a(-1+2)^2(-1)(-1-1)^2$$

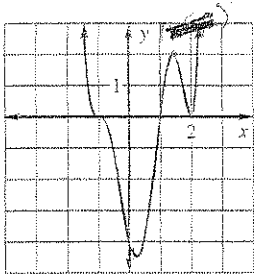
$$-4 = a(1)(-1)(-2)^2$$

$$-4 = -4a$$

$$1 = a$$

$$\underline{y = 1(x+2)^2(x)(x-1)^2}$$

44.



$$2 = a(x+1)^3(x-1)(x-2)^2$$

$$2 = a(1.5+1)^3(1.5-1)(1.5-2)^2$$

$$2 = a(15.625)(.5)(.25)$$

$$\frac{1.024}{.512} = a \text{ using } (1.5, 2)$$

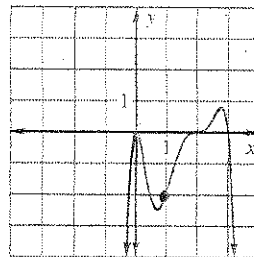
$$\underline{1.024 = a \text{ using } (0, -4)}$$

$$\underline{y = \frac{1.024}{.512}(x+1)^3(x-1)(x-2)^2}$$

$$\underline{y = 1.024(x+1)^3(x-1)(x-2)^2}$$

same answer

45.



$$-2 = a(x)^2(x-2)^3(x-3)$$

$$-2 = a(1)^2(-1)^3(-2)$$

$$-2 = 2a$$

$$-1 = a$$

$$\underline{y = -(x)^2(x-2)^3(x-3)}$$