Test 2

Name Solution 2/27/14

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the power function that the graph of f resembles for large values of |x|.

1) $f(x) = -x^2(x + 9)^3(x^2 - 1)$

A) $y = x^7$ B) $y = -x^7$ C) $y = x^2$ D) $y = x^3$

1) B

$y \sim -x^2 x^3 x^2 \sim -x^7$

Find the real zeros of the function. List the x-intercepts of the graph of the function.

2) $f(x) = 4(x + 1)^2 + 15(x + 1) + 9$

A) $x = -\frac{7}{16}, x = -3$ B) $x = \frac{1}{2}, x = 2$ C) $x = -\frac{7}{4}, x = -4$ D) $x = -\frac{3}{4}, x = -4$

2) C

$f(x)=0 \; ; (x+1)=y \rightarrow 4y^2+15y+9=0$

$(4y+3)(y+3)$ $y=-3$ $x=-4$ or $y=-\frac{3}{4}$ $x=-\frac{7}{4}$

Find the x- and y-intercepts of f.

3) $f(x) = (x + 5)(x - 4)(x + 4)$

A) x-intercepts: -5, -4, 4; y-intercept: 80 B) x-intercepts: -4, 4, 5; y-intercept: 80

C) x-intercepts: -5, -4, 4; y-intercept: -80 D) x-intercepts: -4, 4, 5; y-intercept: -80

3) C

x-int -5, 4, -4 y-int -80

Find the zeros of the quadratic function by completing the square. List the x-intercepts of the graph of the function.

4) $f(x) = x^2 - \frac{5}{2}x + \frac{25}{16}$

A) $x = -\frac{5}{4}, x = \frac{5}{4}$ B) $x = \frac{5}{4}, x = -\frac{5}{4}$ C) $x = \frac{5}{4}, x = \frac{5}{4}$ D) $x = -\frac{5}{4}, x = -\frac{5}{4}$

4) C

$f(x) = x^2 - \frac{5}{2}x + \left(\frac{5}{4}\right)^2 + \frac{25}{16} - \left(\frac{5}{4}\right)^2 = \left(x - \frac{5}{4}\right)^2$

Find the zeros of the quadratic function using the Square Root Method. List the x-intercepts of the graph of the function.

5) $h(x) = (x + 5)^2 - 49$

A) $x = -12$ B) $x = -12, x = 2$ C) $x = 2$ D) $x = -7, x = 7$

5) B

$x+5 = \pm 7$ $x = -5 \pm 7$ $\langle -12, 2$

For the polynomial, list each real zero and its multiplicity. Determine whether the graph crosses or touches the x-axis at each x -intercept.

6) $f(x) = \frac{1}{3}x^4(x^2 - 3)(x - 3)$

6) B

A) 0, multiplicity 4, crosses x-axis;
3, multiplicity 1, touches x-axis

B) 0, multiplicity 4, touches x-axis;
3, multiplicity 1, crosses x-axis;
$\sqrt{3}$, multiplicity 1, crosses x-axis;
$-\sqrt{3}$, multiplicity 1, crosses x-axis

C) 0, multiplicity 4, crosses x-axis;
3, multiplicity 1, touches x-axis;
$\sqrt{3}$, multiplicity 1, touches x-axis;
$-\sqrt{3}$, multiplicity 1, touches x-axis

D) 0, multiplicity 4, touches x-axis;
3, multiplicity 1, crosses x-axis

List the potential rational zeros of the polynomial function. Do not find the zeros.

7) $f(x) = 6x^4 + 3x^3 - 4x^2 + 2$ 7) B

A) $\pm\frac{1}{2}, \pm\frac{3}{2}, \pm 1, \pm 2, \pm 3, \pm 6$

B) $\pm\frac{1}{6}, \pm\frac{1}{3}, \pm\frac{1}{2}, \pm\frac{2}{3}, \pm 1, \pm 2$

C) $\pm\frac{1}{6}, \pm\frac{1}{3}, \pm\frac{1}{2}, \pm 1, \pm 2$

D) $\pm\frac{1}{6}, \pm\frac{1}{3}, \pm\frac{1}{2}, \pm\frac{2}{3}, \pm 1, \pm 2, \pm 3$

Solve the problem.

8) As part of a physics experiment, Ming drops a baseball from the top of a 330-foot building. To the nearest tenth of a second, for how many seconds will the baseball fall? (Hint: Use the formula $h = 16t^2$, which gives the distance h, in feet, that a free-falling object travels in t seconds.) 8) C

A) 1.1 sec B) 82.5 sec C) 4.5 sec D) 20.6 sec

$330 = 16t^2 \quad \therefore \frac{330}{16} = t^2 \quad \therefore t = \frac{\sqrt{330}}{2}$

Use the Factor Theorem to determine whether x - c is a factor of f. If it is, write f in factored form, that is, write f in the form f(x) = (x - c)(quotient).

9) $f(x) = x^4 + 11x^3 + 3x^2 + 28x - 55$; $c = -11$ 9) D

A) No

B) Yes; $f(x) = (x - 11)(x^3 + 3x + 5)$

C) Yes; $f(x) = (x + 11)(x^3 + x - 5)$

D) Yes; $f(x) = (x + 11)(x^3 + 3x - 5)$

-11 | 1 11 3 28 −55
−11 0 −33 55
1 0 3 −5 | 0 yes

Use the Intermediate Value Theorem to determine whether the polynomial function has a zero in the given interval.

10) $f(x) = 10x^3 - 8x^2 + 2x + 1$; $[-1, 0]$ 10) A

A) $f(-1) = -19$ and $f(0) = 1$; yes

B) $f(-1) = -19$ and $f(0) = -1$; no

C) $f(-1) = 19$ and $f(0) = 1$; no

D) $f(-1) = 19$ and $f(0) = -1$; yes

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the real zeros, if any, of each quadratic function using the quadratic formula. List the x-intercepts, if any, of the graph of the function. Show Work for Full Credit.

11) $H(x) = 4x^2 - 11x - 3$ 11) $-\frac{1}{4}, 3$

$x = \frac{11 \pm \sqrt{121 - 4(4)(-3)}}{8} = \frac{11 \pm \sqrt{121 + 48}}{8} = \frac{11 \pm \sqrt{169}}{8}$

$\frac{11+13}{8} = 3$

$\frac{11-13}{8} = -\frac{1}{4}$

Use factoring to find the zeros of the quadratic function. List the x-intercepts of the graph of the function. Show Work for Full Credit.

12) $h(x) = x^2 + 6x - 40$ 12) $-10, 4$

$h(x) = (x+10)(x-4)$

$x = -10, 4$

Solve the inequality. Show Work for Full Credit.

13) $x^2 - 2x \le 0$

13) $[0,2]$

$x(x-2) \le 0$

Find the vertex and axis of symmetry of the graph of the function.

14) $f(x) = x^2 + 2x - 3$

14) $x=-1$ axis of symmetry.

Vertex $(-1,-4)$

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

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

Analyze the graph of the given function f as follows:

(a) Determine the end behavior: find the power function that the graph of f resembles for large values of $|x|$.

(b) Find the x- and y-intercepts of the graph.

(c) Determine whether the graph crosses or touches the x-axis at each x-intercept.

(d) Use the information obtained in (a) – (c) to draw a complete graph of f by hand. Label all intercepts and turning points.

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

15) _____

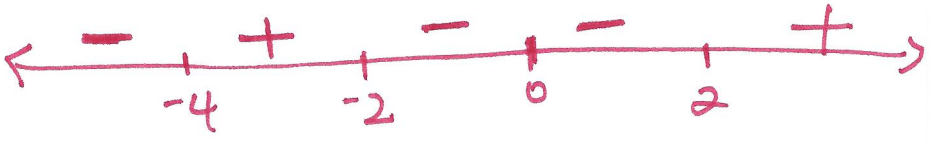
a) as $x \to \infty$ $f(x) \sim x^5 \to \infty$

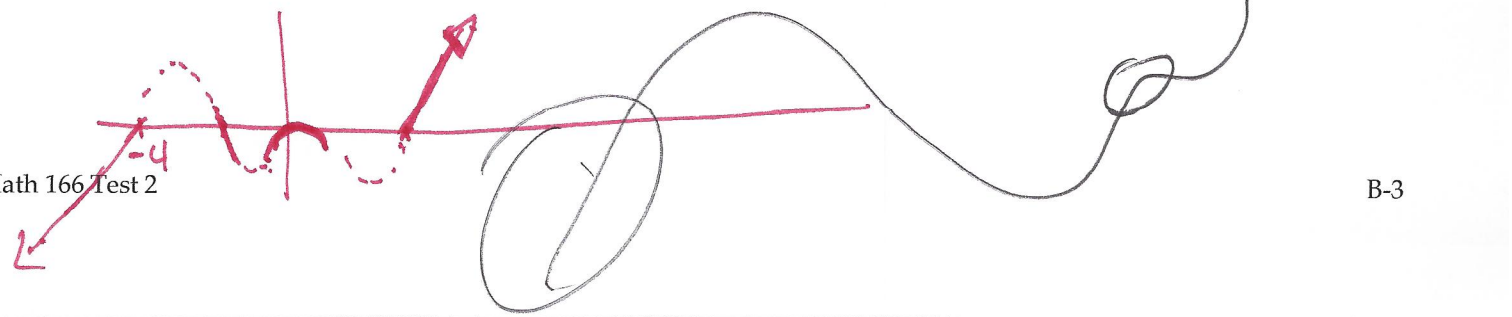
as $x \to -\infty$ $f(x) \to -\infty$

b) x-int $0, 2, -2, -4$

y-int 0

c) at 0 touch at $x = 2, -2$, and -4 crosses.





Test 2

Name Solutions 2/27/14

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the power function that the graph of f resembles for large values of |x|.

1) $f(x) = -x^2(x+6)^3(x^2-1)$ 1) D

A) $y = x^7$ B) $y = x^2$ C) $y = x^3$ D) $y = -x^7$

$f(x) \sim -x^2 x^3 x^2 = -x^7$

Find the real zeros of the function. List the x-intercepts of the graph of the function.

2) $f(x) = 2(x+1)^2 + 7(x+1) + 5$ 2) C

A) $x = -\frac{5}{2}, x = -2$ B) $x = 2, x = 0$ C) $x = -\frac{7}{2}, x = -2$ D) $x = -\frac{7}{4}, x = -1$

$y = (x+1)$ $2y^2 + 7y + 5 = 0 \therefore (2y+5)(y+1) = 0$

$y = -1$ $y = -\frac{5}{2}$

Find the x- and y-intercepts of f.

3) $f(x) = (x+5)(x-3)(x+3)$ 3) C

A) x-intercepts: -5, -3, 3; y-intercept: 45

B) x-intercepts: -3, 3, 5; y-intercept: -45

C) x-intercepts: -5, -3, 3; y-intercept: -45

D) x-intercepts: -3, 3, 5; y-intercept: 45

Find the zeros of the quadratic function by completing the square. List the x-intercepts of the graph of the function.

4) $f(x) = x^2 + 3x + \frac{5}{4}$ 4) C

A) $x = -\frac{5}{2}, x = \frac{1}{2}$ B) $x = \frac{5}{2}, x = -\frac{1}{2}$ C) $x = -\frac{5}{2}, x = -\frac{1}{2}$ D) $x = \frac{5}{2}, x = \frac{1}{2}$

Find the zeros of the quadratic function using the Square Root Method. List the x-intercepts of the graph of the function.

5) $h(x) = (x+4)^2 - 36$ 5) D

A) $x = -6, x = 6$ B) $x = 2$ C) $x = -10$ D) $x = -10, x = 2$

For the polynomial, list each real zero and its multiplicity. Determine whether the graph crosses or touches the x-axis at each x -intercept.

6) $f(x) = \frac{1}{2}x^2(x^2-5)(x-6)$ 6) A

A) 0, multiplicity 2, touches x-axis;
6, multiplicity 1, crosses x-axis;
$\sqrt{5}$, multiplicity 1, crosses x-axis;
$-\sqrt{5}$, multiplicity 1, crosses x-axis

B) 0, multiplicity 2, crosses x-axis;
6, multiplicity 1, touches x-axis

C) 0, multiplicity 2, touches x-axis;
6, multiplicity 1, crosses x-axis

D) 0, multiplicity 2, crosses x-axis;
6, multiplicity 1, touches x-axis;
$\sqrt{5}$, multiplicity 1, touches x-axis;
$-\sqrt{5}$, multiplicity 1, touches x-axis

List the potential rational zeros of the polynomial function. Do not find the zeros.

7) $f(x) = 6x^4 + 4x^3 - 2x^2 + 2$ 7) B

A) $\pm\frac{1}{6}, \pm\frac{1}{3}, \pm\frac{1}{2}, \pm 1, \pm 2$

B) $\pm\frac{1}{6}, \pm\frac{1}{3}, \pm\frac{1}{2}, \pm\frac{2}{3}, \pm 1, \pm 2$

C) $\pm\frac{1}{6}, \pm\frac{1}{3}, \pm\frac{1}{2}, \pm\frac{2}{3}, \pm 1, \pm 2, \pm 3$

D) $\pm\frac{1}{2}, \pm\frac{3}{2}, \pm 1, \pm 2, \pm 3, \pm 6$

Solve the problem.

8) As part of a physics experiment, Ming drops a baseball from the top of a 315-foot building. To the nearest tenth of a second, for how many seconds will the baseball fall? (Hint: Use the formula $h = 16t^2$, which gives the distance h, in feet, that a free-falling object travels in t seconds.) 8) D

A) 19.7 sec B) 78.8 sec C) 1.1 sec D) 4.4 sec

$16t^2 = 315 \quad t^2 = \frac{315}{16} \quad \therefore t = \frac{\sqrt{315}}{4} = 4.4\text{sec}$

Use the Factor Theorem to determine whether x - c is a factor of f. If it is, write f in factored form, that is, write f in the form f(x) = (x - c)(quotient).

9) $f(x) = x^4 + 6x^3 + 5x^2 + 27x - 18; c = -6$ 9) B

A) No

B) Yes; $f(x) = (x + 6)(x^3 + 5x - 3)$

C) Yes; $f(x) = (x + 6)(x^3 + x - 3)$

D) Yes; $f(x) = (x - 6)(x^3 + 5x + 3)$

$-6 \mid 1 \;\; 6 \;\; 5 \;\; 27 \;\; -18$

$\quad\quad -6 \;\; 0 \;\; -30 \;\; 18$

$\quad 1 \;\; 0 \;\; 5 \;\; -3 \;\; 0$

Use the Intermediate Value Theorem to determine whether the polynomial function has a zero in the given interval.

10) $f(x) = 3x^3 - 8x^2 - 10x - 1; [3, 4]$ 10) A

A) f(3) = -22 and f(4) = 23; yes

B) f(3) = -22 and f(4) = -23; no

C) f(3) = 22 and f(4) = -23; yes

D) f(3) = 22 and f(4) = 23; no

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the real zeros, if any, of each quadratic function using the quadratic formula. List the x-intercepts, if any, of the graph of the function. Show Work for Full Credit.

11) $H(x) = 4x^2 - 23x - 6$ 11) $x = -\frac{1}{4}, x = 6$

$$\frac{23 \pm \sqrt{(23)^2 - 4(4)(-6)}}{8}$$

Use factoring to find the zeros of the quadratic function. List the x-intercepts of the graph of the function. Show Work for Full Credit.

12) $h(x) = x^2 + 3x - 10$ 12) -5, 2

$(x + 5)(x - 2) = 0$

Solve the inequality. Show Work for Full Credit.

13) $x^2 - 5x \le 0$

13) $[0, 5]$.

$x(x-5) \le 0$

Find the vertex and axis of symmetry of the graph of the function.

14) $f(x) = x^2 + 2x - 8$

14) $x = -1$ axis of sym

Vertex $(-1, -9)$

$f(x) = x^2 + 2x + 1 - 8 - 1$

$f(x) = (x+1)^2 - 9$

Analyze the graph of the given function f as follows:

(a) Determine the end behavior: find the power function that the graph of f resembles for large values of $|x|$.

(b) Find the x- and y-intercepts of the graph.

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

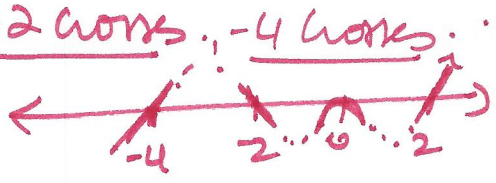
15) _____

a) $f(x) \sim x^5$ as $x \to \infty$ $f(x) \to \infty$

as $x \to -\infty$ $f(x) \to -\infty$.

b,c) x-int 0 touch, 2 cross, -2 cross, -4 cross

y-int 0



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