

Week in Review # 6

MATH 150
3.4 through 4.1

eby-Fall 2002
drost-Fall 2002

Section 3.4

1. Multiply: $(5 - 3i)(4 + 2i)$

2. Divide: $\frac{5 - 3i}{4 + 2i}$

3. Simplify: i^{104}

4. Simplify: $\frac{\sqrt{-36}}{\sqrt{-9}\sqrt{-2}}$

5. Find all solutions: $4x^2 - 16x + 19 = 0$

Section 3.5

6. Factor completely: $P(x) = 4x^2 + 9$

7. Factor completely: $Q(x) = x^3 - 64$

8. Find a polynomial with integer coefficients of least degree with zeros of 3, and $2 - i$.

9. Find all the zeros of: $P(x) = x^4 + x^3 + 7x^2 + 9x - 18$

10. Show that $(1 - i)$ is a solution of:
 $x^2 - (1 + i)x + (2 + 2i) = 0$

Section 3.6

11. Find the horizontal and vertical asymptotes of:

a. $f(x) = \frac{2x^2 - 5x + 2}{x^2 + x - 12}$

b. $g(x) = \frac{3x^2 + 5x - 2}{x^2 + 3x + 2}$

c. $h(x) = \frac{4}{x - 1}$

12. Find the intercepts of $f(x)$, $g(x)$, and $h(x)$ above.

13. Graph: $s(x) = \frac{2x - 4}{x^2 + x - 2}$

14. Given $f(x) = \frac{x^2 + 2x}{x - 1}$

- Find the oblique asymptote.
- Find the vertical asymptote.
- Find the intercepts.
- Graph

15. Given $g(x) = \frac{2x^3 + 2x}{x^2 - 1}$

- Find the oblique asymptote.
- Find the vertical asymptote.
- Find the intercepts.
- Graph

Section 4.1

16. Describe each of the following graphs in relation to $f(x) = 3^x$.

a. $g(x) = 3^{x+2}$

b. $h(x) = 3^x + 4$

c. $F(x) = 3^{-x}$

17. Radioactive iodine is used by doctors as a tracer in diagnosing certain thyroid gland disorders. This type of iodine decays in such a way that the mass remaining after t days is given by the function:

$$m(t) = 6e^{-0.087t}$$

- Find the mass at time $t = 0$.
- How much of the mass remains after 20 days?

18. The population of deer on the Academy grounds is limited by space and food. The population behaves according to the logistic growth model:

$$p(t) = \frac{2940}{1 + 20e^{-0.01t}}$$

- Find the initial population of the herd.
- What size does the population approach as time goes on?

19. \$4000 is borrowed at 16% interest per year compounded quarterly. Find the amount due at the end of 8 years.

20. Bank Alpha offers $7\frac{3}{4}\%$ compounded semi-annually, and Bank Bravo offers 7.7% compounded continuously. If a \$20,000 inheritance is deposited for a period of 10 years, in which Bank would the inheritance grow the most? How much more?

ANSWERS:

1. $26 - 2i$

2. $\frac{7}{10} - \frac{11}{10}i$

3. 1

4. $-\sqrt{2} \cdot i$

5. $2 \pm \frac{i\sqrt{3}}{2}$

6. $P(x) = (2x + 3i)(2x - 3i)$

7. $Q(x) = (x - 4)(x + 2 + 2\sqrt{3}i)(x + 2 - 2\sqrt{3}i)$

8. $P(x) = x^3 - 7x^2 + 17x - 15$
9. $x = 1, -2, 3i, -3i$
10. $1 - i$ is a root, since the remainder is zero.
- 11a. horiz asym: $y = 2$; vert asym: $x = -4, 3$
- 11b. horiz asym: $y = 3$; vert asym: $x = -1$
- 11c. horiz asym: $y = 0$; vert asym: $x = 1$
- 12a. y-intercept: $(0, -\frac{1}{6})$; x-intercept: $(2, 0), (\frac{1}{2}, 0)$
- 12b. y-intercept $(0, -1)$; x-intercept $(\frac{1}{3}, 0)$
- 12c. y-intercept $(0, -4)$; x-intercept: none
13. horiz asym: $y = 0$; vert asym: $x = -2, 1$;
intercepts: $(0, 2), (2, 0)$
14. oblique asym: $y = x + 3$; vert asym: $x = 1$;
intercepts: $(0, 0), (-2, 0)$
15. oblique asym: $y = 2x$; vert asym: $x = 1, -1$;
intercepts: $(0, 0)$
- 16a. rigid transformation shifted left 2
- 16b. rigid transformation shifted up 4
- 16c. rigid transformation reflected about y-axis
- 17a. 6 units
- 17b. 1.05 units
18. a) 140 deer; b) 2940 deer
19. \$14,032.23
20. Bank Bravo pays \$414.35 more.