

Pre-Calculus Summer Review
Due the first day of class

Work all problems on your own paper. You must show your work.

May
20 14

- Solve $\frac{2}{3}a + 3 = 2a - 11$
- A theater has 600 tickets to sell for a show. Of these tickets, 225 sell for \$2 more than the others. If all tickets are sold and \$2250 is taken for the show, what price is each type of ticket?
- Solve $3(5t + 4) < 13t - 10$
- Solve $|2 - 3x| > 1$. Write your answers in interval notation.
- Find the largest of three consecutive even integers whose sum is less than 105.
- Find the slope of the line that passes through $(-2, -7)$ and $(0, 9)$
- Find the slope of the line that is parallel to the line $3x + 4y = 9$.
- Find the equation in slope intercept form and standard form of the line that passes through $(4, -3)$ and perpendicular to $3x - y = 5$.
- Solve the system $y < 3x - 2$, $y \geq \frac{1}{2}x + 1$ by graphing.
- Simplify (a) $\frac{3}{2}(6x^2 - 8y + 2xy) - 3x(5x - y)$ (b) $(-2a^2)^3(-a)^2 - (5a^4)^2$
- Factor completely (a) $4x^3y - 9xy^3$ (b) $6d^2 + 3ed + 10d + 5e$ (c) $x^4 - 10x^2 + 9$
- Simplify each (a) $\left(\frac{4b^2u}{3u^2}\right)\left(\frac{2u^3}{b^2}\right)^2$ (b) $\frac{5x^2 - 20}{3x^2 + 5x - 2}$ (c) $\frac{1}{x^2 + 4x} - \frac{1}{(x+4)^2}$ (d) $\frac{\frac{1}{y^2} - \frac{1}{x^2}}{\frac{x}{y} + 2 + \frac{y}{x}}$ (e) $\left(\frac{a^{-3}b^{-1}}{a^2b^0}\right)^{-2}$
- A library crew can shelve books in six hours. Another crew can do the job in four hours. If the first crew begins and is joined by the second crew one hour later, how many hours will it take to finish the job?
- Simplify (a) $\sqrt[4]{\frac{64b^4c^5}{d^3}}$ (b) $\sqrt[3]{54} - \sqrt[3]{\frac{1}{4}} + \sqrt[3]{16}$ (c) $\frac{4}{\sqrt{2} - \sqrt{6}}$ (d) $(\sqrt{-48})(2\sqrt{-27})$ (e) $\frac{1+i\sqrt{5}}{2+i\sqrt{5}}$
- Solve (a) $(t-1)^2 = 7$ (b) $5s^2 - 13s + 6 = 0$ (c) $x^4 + 5x^2 - 36 = 0$ (d) $(t^2 + 3)^2 = (t^2 + 3) + 12$ (e) $\sqrt[3]{2x^2 - x} = 2$
- Find all values for K so that the equation $3t^2 - 6t + k = 0$ has two real unequal roots.
- Find an equation of the form $y - k = a(x - h)^2$ for the parabola that has vertex $(1, -5)$ and contains $(-4, 3)$.
- Find a quadratic equation having $3 \pm \sqrt{3}$ as roots.
- Find a quadratic function $f(x) = ax^2 + bx + c$ whose graph has a maximum value at 25 and x-intercepts -3 and 2.
- Sketch (a) $y - 2 = -\frac{1}{2}x^2$ (b) $y = (x - 2)^2$ (c) $y = 3 - (x + 1)^2$
- Suppose z varies directly/as x and y and inversely as w, and z = 8 when x = 6, y = 5 and w = 10. Find z when x = 3, y = 4 and w = 5.
- Use synthetic division to find the quotient and remainder of $(x^4 - 8x^2 + 5x + 6) \div (x + 3)$.
- Find a cubic equation whose roots are -4 and -6i.

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24. Solve $x^3 - 3x^2 + 2x - 6$ using factoring by grouping and the rational root theorem.
25. Find the length and midpoint of AB if $A = (-\frac{1}{2}, 1)$ and $B = (2, -5)$.
26. Find the center and radius of the circle $x^2 + y^2 - 8x = 6y$.
27. Find the equation of the parabola with vertex $(-1, 3)$ and focus $(1, 3)$.
28. Graph the ellipse $25x^2 + 36y^2 = 900$ and find the foci.
29. Find the equation of the hyperbola with foci $(3, -6)$ and $(3, 2)$ and with 6 as the difference of focal radii.
30. Identify the conic $5x^2 + 9y^2 - 40x - 18y + 44 = 0$ and give the coordinates of its center.
31. Simplify $\left(\frac{8}{27}\right)^{-\frac{4}{3}}$.
32. Solve (a) $\log_{32} x = -\frac{2}{5}$ (b) $\log_x 9 = -\frac{1}{2}$ (c) $\log_{\frac{1}{2}} 32 = x$
33. Express $3\log_7 p - 2\log_7 q$ as a single logarithm.
34. Use a calculator to find x to three significant digits. (a) $2.5^{\frac{x}{3}} = 59$ (b) $\log x = 0.286$
35. Solve $\ln(x+3) = 1$. Leave answer in terms of e .
36. Solve $e^x = 7$. Leave your answer in terms of natural logarithms.
37. Find the exact values for each of the following angles. (a) $\csc(-150^\circ)$ (b) $\tan(480^\circ)$ (c) $\cos(315^\circ)$
38. Solve the right triangle if $b = 3.90$ and $c = 42.5$. $a = \underline{\hspace{2cm}}$ $A = \underline{\hspace{2cm}}$ $B = \underline{\hspace{2cm}}$.
39. The angle of elevation from an observer on the street to the top of a building is 55.6 degrees. If the observer is 150 feet from the base of the building, how tall is the building?
40. In $\triangle ABC$, $a = 6$, $b = 10$, and $c = 7$. Find the largest angle to the nearest tenth of a degree.
41. Verbena is 8 miles east of Elba and Opp is 10 miles northwest of Elba. How far is Verbena from Opp?
42. Solve $x - y + 4z = 4$, $2x + 3y - 3z = 1$, $3x + 2y - 2z = -1$.

Use the matrices A, B, C, and D for problem 43.

$$A = \begin{bmatrix} 4 & 1 & 3 \\ -2 & -1 & 2 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 2 & 3 \\ 5 & -1 & 2 \end{bmatrix} \quad C = \begin{bmatrix} 2 & 1 & 1 \\ -2 & -4 & -6 \\ 0 & 3 & 1 \end{bmatrix} \quad D = \begin{bmatrix} 5 & -1 \\ -5 & 3 \end{bmatrix}$$

43. Find each: (a) $B - 2A$ (b) $\det C$ (c) D^{-1} (d) DB (e) C^{-1} (f) $\det D$
44. How many ways can you select a committee of five people from class of 20 people?
45. How many ways can 8 people be lined up in a row for a photograph?
46. A bag contains 2 red, 4 yellow, and 6 blue marbles. Find the probability that one is red and one is blue if 2 are chosen at random.