

Final Exam Review Problems

Name:

Date: June 23, 2013

P 1.4. 33. Determine whether the line $x = 4$ represents y as a function of x .

P 1.5. 37. Graph

$$f(x) = \frac{3x - 1}{x - 6}.$$

Find the x and y -intercepts and asymptotes (if any). Include a table of nice values for which to evaluate f and the corresponding values of f .

P 1.5. 61. Graph

$$f(x) = x(x - 2)(x + 3).$$

Find the x and y -intercepts and asymptotes (if any). Include a table of nice values for which to evaluate f and the corresponding values of f .

P 1.6. 29. Graph

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

Find the x and y -intercepts and asymptotes (if any). Include a table of nice values for which to evaluate f and the corresponding values of f .

P 1.6. 31. Graph

$$f(x) = 4\sqrt{x}$$

Find the x and y -intercepts and asymptotes (if any). Include a table of nice values for which to evaluate f and the corresponding values of f .

P 1.6. 11. Use the graph of f to sketch each graph.

(a) $y = f(x) + 2$

(b) $y = f(x - 2)$

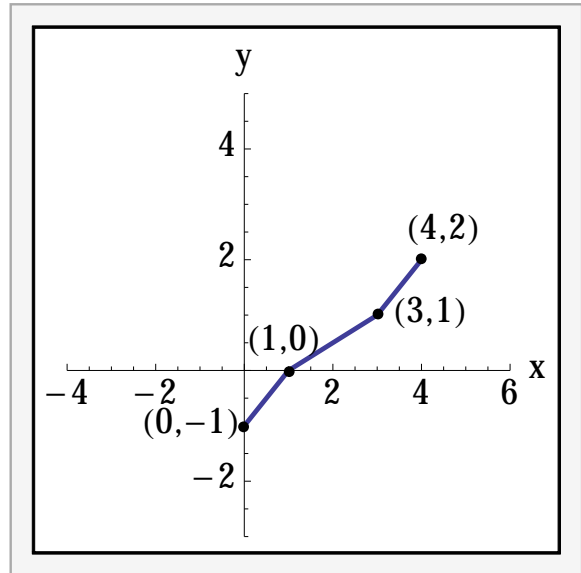
(c) $y = 2f(x)$

(d) $y = -f(x)$

(e) $y = f(x + 3)$

(f) $y = f(-x)$

(g) $y = f\left(\frac{1}{2}x\right)$



P 1.6. 31. Graph

$$g(x) = 3 - (x + 5)^2.$$

Find the x and y -intercepts and asymptotes (if any). Include a table of nice values for which to evaluate f and the corresponding values of f .

P 1.6. 33. Graph

$$g(x) = 3 + 2(x - 4)^2$$

Find the x and y -intercepts and asymptotes (if any). Include a table of nice values for which to evaluate f and the corresponding values of f .

P 1.6. 53. Graph

$$g(x) = \sqrt{\frac{1}{2}x} - 4$$

Find the x and y -intercepts and asymptotes (if any). Include a table of nice values for which to evaluate f and the corresponding values of f .

P 1.8. 39. Find (a) $f \circ g$ (b) $g \circ f$ and (c) $g \circ g$.

$$f(x) = \sqrt[3]{x-1} \text{ and } g(x) = x^3 + 1.$$

P A. 1. Simplify the expression.

$$\frac{-2(x^2 - 3)^{-3}(2x)(x + 1)^3 - 3(x + 1)^2(x^2 - 3)^{-2}}{[(x + 1)^3]^2}$$

P A. 2. Simplify the expression.

$$\frac{(6x + 1)^3(27x^2 + 2) - (9x^3 + 2x)(3)(6x + 1)^2(6)}{[(6x + 1)^3]^2}$$

P A. 3. Simplify the expression.

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

P A. 4. Simplify the expression.

$$\frac{2(3x - 1)^{1/3} - (2x + 1) \left(\frac{1}{3}\right) (3x - 1)^{-2/3}(3)}{(3x - 1)^{2/3}}$$

P A. 5. Simplify the expression.

$$\frac{1}{(x^2 + 4)^{1/2}} \cdot \frac{1}{2}(x^2 + 4)^{-1/2}(2x)$$

P A. 6. Simplify the expression.

$$(x^2 + 5)^{1/2} \left(\frac{3}{2}\right) (3x - 2)^{1/2}(3) + (3x - 2)^{3/2} \left(\frac{1}{2}\right) (x^2 + 5)^{-1/2}(2x)$$

P CHT 1. 2. A cylindrical can has a volume of 600 cubic centimeters and a radius of 4 centimeters. Find the height of this can.

P CHT 1. 4. Graph

$$y = 4 - |x|$$

Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values.

P CHT 1. 5. Graph

$$y = x^2 - 1.$$

Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values.

P CHT 1. 12. Graph

$$f(x) = 2x^6 + 5x^4 - x^2.$$

Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 1. 13. Graph

$$f(x) = 4x\sqrt{3-x}$$

Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 1. 14. Graph

$$f(x) = |x + 5|.$$

Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 1. 15. Graph

$$f(x) = \begin{cases} 3x + 7, & x \leq -3 \\ 4x^2 - 1, & x > -3 \end{cases}$$

Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 1. 16. Graph

$$h(x) = -[[x]].$$

Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate h and the corresponding values of h . Approximate the intervals over which h is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 1. 17. Graph

$$h(x) = -\sqrt{x+5} + 8.$$

Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate h and the corresponding values of h . Approximate the intervals over which h is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 1. 18. Graph

$$h(x) = -2(x-5)^3 + 3.$$

Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate h and the corresponding values of h . Approximate the intervals over which h is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 1. 19. Find (a) $(f + g)(x)$, (b) $(f - g)(x)$, (c) $(fg)(x)$, (d) $(f/g)(x)$, (e) $(f \circ g)(x)$, and (f) $(g \circ f)(x)$.

$$f(x) = 3x^2 - 7, \quad g(x) = -x^2 - 4x + 5$$

P CHT 1. 20. Find (a) $(f + g)(x)$, (b) $(f - g)(x)$, (c) $(fg)(x)$, (d) $(f/g)(x)$, (e) $(f \circ g)(x)$, and (f) $(g \circ f)(x)$.

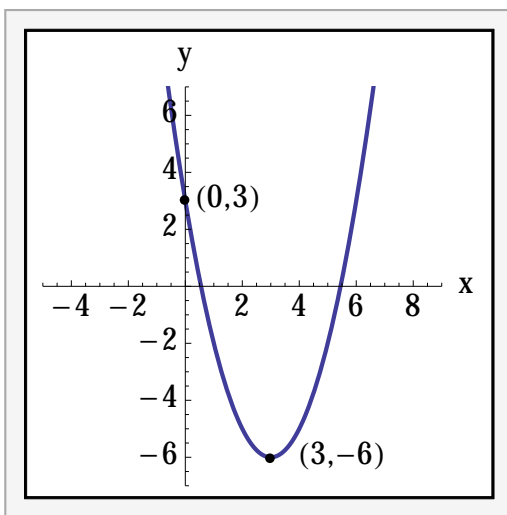
$$f(x) = \frac{1}{x}, \quad g(x) = 2\sqrt{x}$$

P CHT 2. 1. Describe how the graph of g differs from the graph of $f(x) = x^2$.

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

(b) $g(x) = \left(x - \frac{3}{2}\right)^2$

P CHT 2. 2. Find an equation of the parabola.



P CHT 2. 3. The path of a ball is given by $y = -\frac{1}{20}x^2 + 3x + 5$, where y is the height (in feet) of the ball and x is the horizontal distance (in feet) from where the ball was thrown.

- (a) Find the maximum height of the ball. (b) Which number determines the height at which the ball was thrown? Does changing this value change the coordinates of the maximum height of the ball? Explain.

P CHT 2. 4. Determine the right-hand and left-hand behavior of the graph of the function $h(t) = -\frac{3}{4}t^5 + 2t^2$. Then sketch the graph. Find the t and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate h and the corresponding values of h . Approximate the intervals over which h is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 2. 5. Divide using long division

$$\frac{3x^3 + 4x + 1}{x^2 + 1}$$

P CHT 2. 6. Divide using synthetic division

$$\frac{2x^4 - 5x^2 - 3}{x - 2}$$

P CHT 2. 7. Use synthetic division to show that $x = 5/2$ is a zero of the function given by $f(x) = 2x^3 - 5x^2 - 6x + 15$.

P CHT 2. 8. Perform each operation and write the result in standard form

(a) $10i - (3 + \sqrt{-25})$

(b) $(2 + \sqrt{3}i)(2 - \sqrt{3}i)$

P CHT 2. 9. Write the quotient in standard form: $\frac{5}{2+i}$.

P CHT 2. 10. Find a polynomial function with real coefficients that has the given zeros. **P CHT 2. 11.** Find a polynomial function with real coefficients that has the given zeros.

$0, 3, 2 + i$

$1 - \sqrt{3}i, 2, 2$

P CHT 2. 12. Find all the zeros of

$$f(x) = 3x^3 + 14x^2 - 7x - 10.$$

P CHT 2. 13. Find all the zeros of

$$f(x) = x^4 - 9x^2 - 22x + 24.$$

P CHT 2. 14. Determine the right-hand and left-hand behavior of the graph of the function $h(x) = \frac{4}{x^2} - 1$. Then sketch the graph. Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate h and the corresponding values of h . Approximate the intervals over which h is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 2. 15. Determine the right-hand and left-hand behavior of the graph of the function

$$f(x) = \frac{2x^2 - 5x - 12}{x^2 - 16}.$$

Then sketch the graph. Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate h and the corresponding values of h . Approximate the intervals over which h is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 2. 16. Determine the right-hand and left-hand behavior of the graph of the function

$$g(x) = \frac{x^2 + 2}{x - 1}$$

Then sketch the graph. Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate h and the corresponding values of h . Approximate the intervals over which h is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 2. 17. Solve

$$2x^2 + 5x > 12.$$

Express your solution in interval notation and sketch a number line corresponding to that interval.

P CHT 2. 18. Solve

$$\frac{2}{x} \leq \frac{1}{x+6}$$

Express your solution in interval notation and sketch a number line corresponding to that interval.

P CHT 3. 5. Determine the right-hand and left-hand behavior of the graph of the function

$$f(x) = 10^{-x}$$

Then sketch the graph. Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 3. 6. Determine the right-hand and left-hand behavior of the graph of the function

$$f(x) = -6^{x-2}$$

Then sketch the graph. Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 3. 7. Determine the right-hand and left-hand behavior of the graph of the function

$$f(x) = 1 - e^{2x}$$

Then sketch the graph. Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 3. 8. Evaluate (a) $\log_7 7^{-0.89}$ (b) $4.6 \ln e^2$.

P CHT 3. 9. Determine the right-hand and left-hand behavior of the graph of the function

$$f(x) = -\log x - 6$$

Then sketch the graph. Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 3. 10. Determine the right-hand and left-hand behavior of the graph of the function

$$f(x) = \ln(x - 4)$$

Then sketch the graph. Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 3. 12. Determine the right-hand and left-hand behavior of the graph of the function

$$f(x) = 1 + \ln(x + 6)$$

Then sketch the graph. Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 3. 15. Expand

$$\log_2 3a^4$$

P CHT 3. 16. Expand

$$\ln \frac{5\sqrt{x}}{6}$$

P CHT 3. 17. Expand

$$\log \frac{(x-1)^3}{y^2z}$$

P CHT 3. 18. Condense

$$\log_3 13 + \log_3 y$$

P CHT 3. 19. Condense

$$4 \ln x - 4 \ln y$$

P CHT 3. 20. Condense

$$3 \ln x - \ln(x + 3) + 2 \ln y$$

P CHT 3. 21. Solve

$$5^x = \frac{1}{25}$$

P CHT 3. 22. Solve

$$3e^{-5x} = 132$$

P CHT 3. 23. Solve

$$\frac{1025}{8 + e^{4x}} = 5$$

P CHT 3. 24. Solve

$$\ln x = \frac{1}{2}$$

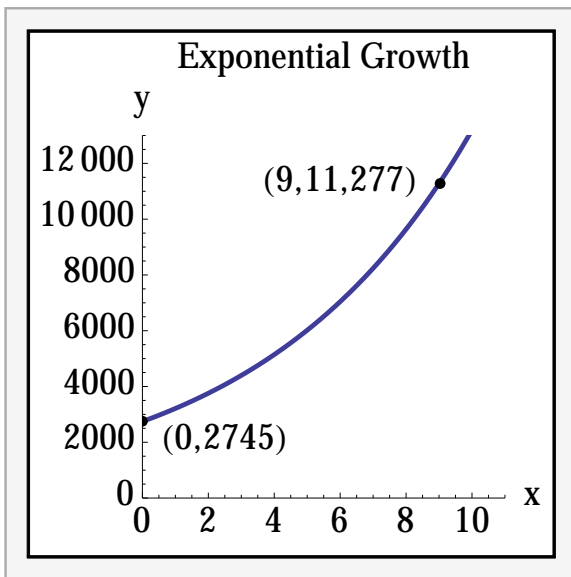
P CHT 3. 25. Solve

$$18 + 4 \ln x = 7$$

P CHT 3. 26. Solve

$$\log x + \log(x - 15) = 2$$

P CHT 3. 27. Find an exponential growth model for the graph shown

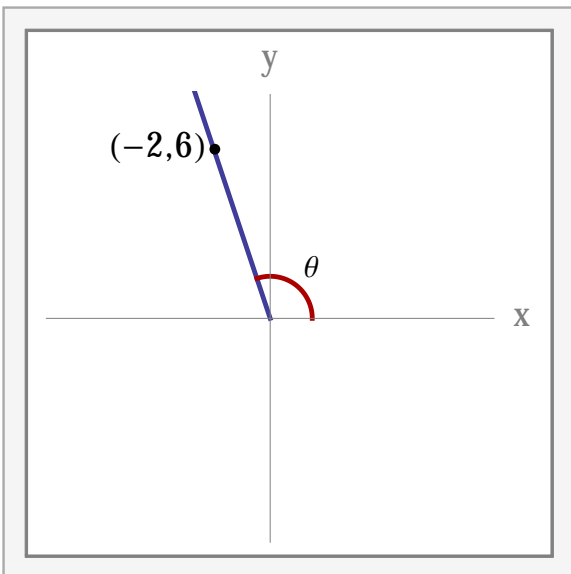


P CHT 3. 28. The half-life of radioactive actinium (^{227}Ac) is 21.77 years. What percent of a present amount of radioactive actinium will remain after 19 years?

P CHT 4. 1. Consider an angle that measures $\frac{5\pi}{4}$ radians.

- (a) Sketch the angle in standard position. (b) Determine two coterminal angles (one positive and one negative). (c) Convert the angle to degree measure.

P CHT 4. 4. Find the exact values of the six trigonometric functions of the angle θ shown.



P CHT 4. 5. Given $\tan \theta = \frac{3}{2}$, find the other five trigonometric functions of θ (Assume θ is in the Quadrant III).

P CHT 4. 6. Determine the reference angle θ' for the angle $\theta = 205^\circ$ and sketch θ and θ' in standard position.

P CHT 4. 7. Determine the quadrant in which θ lies if $\sec \theta < 0$ and $\tan \theta > 0$.

P CHT 4. 8. Find two exact values of θ in degrees ($0 \leq \theta \leq 360^\circ$) if $\cos \theta = -\frac{\sqrt{3}}{2}$.

P CHT 4. 9. Find two exact values of θ in radians ($0 \leq \theta \leq 2\pi$) if $\csc \theta = 1.030$.

P CHT 4. 10. Find the remaining five trigonometric functions of θ satisfying

$$\cos \theta = \frac{3}{5}, \quad \tan \theta < 0.$$

P CHT 4. 11. Find the remaining five trigonometric functions of θ satisfying

$$\sec \theta = -\frac{29}{30}, \quad \sin \theta > 0.$$

P CHT 4. 12. Graph (Include two full periods)

$$g(x) = -2 \sin \left(x - \frac{\pi}{4} \right).$$

Find the amplitude, period, phase shift, and midline. Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate g and the corresponding values of g . Approximate the intervals over which g is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 4. 13. Graph (Include two full periods)

$$f(\alpha) = \frac{1}{2} \tan 2\alpha$$

Find the period. Find the α and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 4. 17. Find the exact value of $\cot\left(\arcsin\frac{3}{8}\right)$.

P CHT 4. 18. Graph

$$f(x) = 2 \arcsin\left(\frac{1}{2}x\right)$$

Find the x and y -intercepts and asymptotes (if any). Include a table of “nice” values for which to evaluate f and the corresponding values of f . Approximate the intervals over which f is increasing, decreasing, or constant. Determine whether the function is even, odd, or neither.

P CHT 5. 1. If $\tan \theta = \frac{6}{5}$ and $\cos \theta < 0$, find all six trigonometric functions of θ .

P CHT 5. 2. Simplify

$$\csc^2 \beta (1 - \cos^2 \beta)$$

P CHT 5. 3. Simplify

$$\frac{\sec^4 x - \tan^4 x}{\sec^2 x + \tan^2 x}$$

P CHT 5. 4. Simplify

$$\frac{\cos \theta}{\sin \theta} + \frac{\sin \theta}{\cos \theta}$$

P CHT 5. 5. Verify

$$\sin \theta \sec \theta = \tan \theta$$

P CHT 5. 6. Verify

$$\sec^2 x \tan^2 x + \sec^2 x = \sec^4 x$$

P CHT 5. 7. Simplify

$$\frac{\csc \alpha + \sec \alpha}{\sin \alpha + \cos \alpha} = \cot \alpha + \tan \alpha$$

P CHT 5. 8. Verify

$$\tan \left(x + \frac{\pi}{2} \right) = -\cot x$$

P CHT 5. 9. Verify

$$\sin(n\pi + \theta) = (-1)^n \sin \theta,$$

where n is an integer.

P CHT 5. 10. Simplify

$$(\sin x + \cos x)^2 = 1 + \sin 2x$$

P CHT 5. 15. Find all solutions to

$$\tan^2 x + \tan x = 0,$$

on the interval $[0, 2\pi)$.

P CHT 5. 16. Find all solutions to

$$\sin 2\alpha - \cos \alpha = 0$$

on the interval $[0, 2\pi)$.

P CHT 5. 17. Find all solutions to

$$4 \cos^2 - 3 = 0,$$

on the interval $[0, 2\pi)$.

P CHT 5. 18. Find all solutions to

$$\csc^2 x - \csc x - 2 = 0,$$

on the interval $[0, 2\pi)$.

P CHT 5. 19. Find the exact value of $\cos 105^\circ$

P CHT 5. 20. Use the figure to find the exact values of $\sin 2u$, $\cos 2u$, and $\tan 2u$.

