

Practice exam for MATH 022, Fall 05

- Find the equation of the line passing through the two given points: $(-3, 4)$ and $(5, 8)$.
 - $y = 2x + 10$
 - $y = 2x - 11$
 - $y = \frac{1}{2}x + 5\frac{1}{2}$
 - $y = \frac{1}{2}x + 5$
 - $y = \frac{3}{7}x + 5\frac{2}{7}$
- Find the center and the radius of the circle $4x^2 - 4x + 4y^2 - 63 = 0$.
 - center = $(\frac{1}{2}, 0)$, radius = $\sqrt{62}$
 - center = $(\frac{1}{2}, 0)$, radius = 8
 - center = $(2, 0)$, radius = $\sqrt{62}$
 - center = $(2, 0)$, radius = 8
 - center = $(2, 0)$, radius = 64
- Solve the quadratic equation $5y(y - 2) = 2$.
 - $y = \frac{5 \pm \sqrt{15}}{5}$
 - $y = \frac{5 \pm \sqrt{35}}{5}$
 - $y = \frac{10 \pm \sqrt{110}}{10}$
 - no real roots
 - $y = \frac{10 \pm \sqrt{90}}{10}$
- Solve the equation $x^4 - 5x^2 = -6$.
 - $x = \sqrt{2}, x = \sqrt{3}$
 - $x = \pm\sqrt{2}$
 - $x = \pm\sqrt{3}$
 - $x = \pm\sqrt{2}, x = \pm\sqrt{3}$
 - no real solutions
- Solve the inequality $|3x + 5| < 17$.
 - $(-\infty, -\frac{22}{3}] \cup [4, \infty)$
 - $(-\infty, -4) \cup (\frac{22}{3}, \infty)$
 - $(-\infty, -\frac{22}{3}) \cup (4, \infty)$
 - $(-\frac{22}{3}, 4)$
 - $(-4, \frac{22}{3})$
- Solve the inequality $x^2 + 4x - 32 < 0$.
 - $(-8, 4)$
 - $(-\infty, -8) \cup (4, \infty)$
 - $(-\infty, -8] \cup [4, \infty)$
 - $(-4, 8)$
 - $(-\infty, -4) \cup (8, \infty)$
- Solve the inequality $\frac{x+4}{2x-5} \leq 0$.
 - $(-4, \frac{5}{2})$
 - $[-4, \frac{5}{2}]$
 - $(-\infty, -4] \cup [\frac{5}{2}, \infty)$
 - $(-\infty, -4] \cup (\frac{5}{2}, \infty)$
 - $[-4, \frac{5}{2})$
- Find the range of the function $g(x) = \frac{2x-7}{3x+24}$.
 - $(-\infty, \frac{2}{3}) \cup (\frac{2}{3}, \infty)$
 - $(-\infty, \infty)$
 - $(-\infty, -8) \cup (-8, \infty)$
 - $(-\infty, \frac{2}{7}) \cup (\frac{2}{7}, \infty)$
 - $(-\infty, \frac{7}{2}) \cup (\frac{7}{2}, \infty)$

9. The graph of function $f(x)$ is the line segment with the endpoints $(-2, 3)$ and $(3, 0)$. Find the endpoints of the graph of $f(x+2) - 1$.
- $(0, 2)$ and $(5, -1)$
 - $(-4, 4)$ and $(1, 1)$
 - $(-4, 2)$ and $(1, -1)$
 - $(0, 4)$ and $(5, 1)$
 - $(-3, 5)$ and $(2, 2)$
10. A spherical weather balloon is being inflated in such a way that the radius is given by $r(t) = \frac{1}{2}t + 2$, where r is expressed in meters and t is in seconds, with $t = 0$ corresponding to the time that inflation begins. The volume of a sphere of radius r is given by $V(r) = \frac{4}{3}\pi r^3$. Find the time at which the volume of the balloon is 36π m³.
- $t = 3$ s
 - $t = \sqrt[3]{27\pi}$ s
 - $t = 1$ s
 - $t = 2$ s
 - $t = 1.5$ s
11. $f(x) = x^2$, $g(x) = 2x + 1$. Find $f \circ g(x)$.
- $4x^2 + 4x + 1$
 - $2x^3 + x^2$
 - $2x^2 + 1$
 - $2x + x^2$
 - $4x^2 + 1$
12. The graph of function f is the line segment with the endpoints $(-4, 2)$ and $(1, 3)$. Find the endpoints of the graph of f^{-1} .
- $(-\frac{1}{4}, 2)$ and $(1, 3)$
 - $(-4, 1)$ and $(2, 3)$
 - $(-4, 3)$ and $(1, 2)$
 - $(-4, \frac{1}{2})$ and $(1, \frac{1}{3})$
 - $(2, -4)$ and $(3, 1)$
13. $f(x) = x^3 + x^2 + 1$. Which of the following points lies on the graph of the inverse function?
- $(10, 2)$
 - $(12, 2)$
 - $(14, 2)$
 - $(4, 1)$
 - $(3, 1)$
14. Find the linear function whose graph is perpendicular to $y = 2x + 3$ and passes through the point $(1, 1)$.
- $y = -\frac{1}{2}x + 1\frac{1}{2}$
 - $y = \frac{1}{2}x + \frac{1}{2}$
 - $y = \frac{1}{2}x + 1\frac{1}{2}$
 - $y = -2x + 3$
 - $y = 2x - 1$
15. Find the minimal value of the function $f(x) = 4x^2 - 4x + 5$.
- 1
 - 2
 - $\frac{1}{2}$
 - 4
 - $\frac{1}{4}$
16. Find the input, giving the maximum of the function $g(t) = \sqrt[5]{-2t^2 + 12t - 17}$.
- 1
 - 3
 - $\sqrt[5]{3}$
 - 3
 - $\sqrt[5]{-3}$

17. The volume of a right circular cylinder is 20 cm^3 . Express the surface area S as a function of the radius of the base r . (The formula for the volume of a right circular cylinder is $V = \pi r^2 h$, the formula for the surface is $S = 2\pi r^2 + 2\pi r h$).
- $S(r) = 4\pi r^2 + \frac{40}{r}$
 - $S(r) = 2\pi r^2 + \frac{40}{r}$
 - $S(r) = 2\pi r^2 + \frac{20}{r}$
 - $S(r) = 2\pi r^2 + 40r$
 - $S(r) = 4\pi r^2 + 20r$
18. The difference of two numbers is 10. Find the minimum of the sum of their squares.
- 50
 - 5
 - 25
 - 5
 - 0
19. Specify x - and y -intercepts of the function $f(x) = (x^2 - 4)^2$.
- x -intercepts: $-2, 2$; y -intercept: 4
 - x -intercept: -2 ; y -intercept: 4
 - x -intercepts: $-2, 2$; y -intercept: 16
 - x -intercept: -2 and 2 ; no y -intercepts
 - no x -intercepts; y -intercept: 16
20. Find the horizontal and vertical asymptotes of the function $g(x) = \frac{3x+2}{2x+1}$.
- vert.: $x = -2$; horiz.: $y = \frac{3}{2}$
 - vert.: $x = -2$; horiz.: $y = -\frac{3}{2}$
 - vert.: $x = \frac{1}{2}$; horiz.: $y = \frac{3}{2}$
 - vert.: $x = -\frac{1}{2}$; horiz.: $y = -\frac{2}{3}$
 - vert.: $x = -\frac{1}{2}$; horiz.: $y = \frac{3}{2}$
21. Find the domain of the function $h(t) = \frac{1}{2^t - 1}$.
- $(-\infty, 0) \cup (0, \infty)$
 - all real numbers
 - $(-\infty, \frac{1}{2}) \cup (\frac{1}{2}, \infty)$
 - $(-\infty, 1) \cup (1, \infty)$
 - $(-\infty, 0) \cup (1, \infty)$
22. Which of the following properties fails for the function $f(x) = e^{x-1}$?
- Domain is $(-\infty, \infty)$
 - The graph has an asymptote
 - The function is one-to-one
 - Range is $(0, \infty)$
 - The function is decreasing for $-\infty < x < \infty$
23. Evaluate the expression $\log_{25} 125$.
- 5
 - 100
 - 6
 - $\frac{3}{2}$
 - 3
24. Given that $\log_b 2 = A$ and $\log_b 3 = B$ express $\log_{b^2} 36$ in terms of A and B .
- $2AB$
 - AB
 - $2A + 2B$
 - $A^2 + B^2$
 - $A + B$

25. Solve the equation $\log_6 x + \log_6(x + 1) = 0$.
- $x = \frac{-1 \pm \sqrt{5}}{2}$
 - $x = \frac{-1 + \sqrt{5}}{2}$
 - no real solutions
 - $x = 0, x = -1$
 - $x = 0$
26. Solve the inequality $\log_{10}(x^2 - 6x + 9) < 0$.
- $(-\infty, 2) \cup (4, \infty)$
 - $(2, 4)$
 - $(2, 3) \cup (3, 4)$
 - $(-\infty, 2] \cup [4, \infty)$
 - $(-\infty, 3) \cup (3, \infty)$
27. Rewrite using sigma notation $x + 2x^2 + 3x^3 + 4x^4 + 5x^5 + 6x^6$.
- $\sum_{i=1}^6 x$
 - $\sum_{i=1}^6 i$
 - $\sum_{i=3}^8 ix^i$
 - $\sum_{i=1}^6 ix^i$
 - $\sum_{i=x}^6 i$
28. Find the 100-th term of the sequence 2, 5, 8, 11, ...
- 310
 - 300
 - 280
 - 299
 - 302
29. The 3-rd term in an arithmetic sequence is 5 and the 7-th term is -5 . Find the 10-th term.
- -15
 - $-12\frac{1}{2}$
 - $-18\frac{1}{3}$
 - $12\frac{1}{2}$
 - 15
30. Evaluate the sum $S = -\frac{2}{3} + \frac{4}{9} - \frac{8}{27} + \dots$
- -2
 - $-\frac{2}{5}$
 - 2
 - $\frac{2}{5}$
 - $-\frac{6}{11}$