Review Packet for Math 115 (Calculus I)

Note: This packet is a graded assignment due at week 1, detailed work/steps are required for full credit.
The contents will be tested at beginning of the course.

Name_____

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

Find the x– and y–intercepts of f.

1) $f(x) = (x - 2)^2(x^2 - 25)$ 1) _____

Solve the equation in the real number system.

2) $2x^4 - 2x^3 + x^2 - 5x - 10 = 0$ 2) _____

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

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

Solve the equation. Express irrational answers in exact form and as a decimal rounded to 3 decimal places.

4) $\ln x + \ln (x + 7) = 2$ 4) _____

Solve the exponential equation. Express the solution set in terms of natural logarithms.

5) $e^{x + 6} = 8$ 5) _____

Solve the problem.

6) Find out how long it takes a $3400 investment to double if it is invested at 7% compounded semiannually. Round to the nearest tenth of a year. Use the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$. 6) _____

Find the exact value of the expression.

7) $\tan^{-1} \frac{\sqrt{3}}{3}$ 7) _____

Find the inverse function f^{-1} of the function f.

8) $f(x) = 7 \cos x + 6$ 8) _____

Solve the equation on the interval $0 \le \theta < 2\pi$.

9) $2 \cos (2\theta) = \sqrt{3}$ 9) _____

Simplify the expression.

10) $(1 + \cot \theta)(1 - \cot \theta) - \csc^2 \theta$ 10) _____

Solve for the angle θ, where $0 \le \theta \le 2\pi$

11) $\sin 2\theta + \cos \theta = 0$ 11) _____

Give an appropriate answer.

12) Let $\lim_{x \to -9} f(x) = -5$ and $\lim_{x \to -9} g(x) = -7$. Find $\lim_{x \to -9} \left[\frac{-8f(x) - 2g(x)}{-9 + g(x)} \right]$. 12) _____

Find the limit.

13) $\lim_{x \to 0} \frac{\sqrt{1 + x} - 1}{x}$ 13) _____

Provide an appropriate response.

14) If $x^3 \le f(x) \le x$ for x in [−1,1], find $\lim_{x \to 0} f(x)$ if it exists. 14) _____

Find the limit.

15) $\lim_{x \to -2^+} \frac{x^2 - 7x + 10}{x^3 - 4x}$ 15) _____

Find all vertical asymptotes of the given function.

16) $R(x) = \frac{x - 1}{x^3 + 5x^2 - 84x}$ 16) _____

Find the limit.

17) $\lim_{x \to -\infty} \frac{6x^3 + 4x^2}{x - 7x^2}$ 17) _____

18) $\lim_{x\to\infty} \dfrac{2x^3 - 5x^2 + 3x}{-x^3 - 2x + 7}$ 18) _____

Divide numerator and denominator by the highest power of x in the denominator to find the limit.

19) $\lim_{x\to\infty} \sqrt{\dfrac{16x^2}{5 + 49x^2}}$ 19) _____

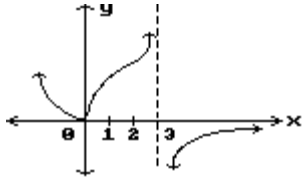
20) $\lim_{t\to\infty} \dfrac{\sqrt{36t^2 - 216}}{t - 6}$ 20) _____

Find all horizontal asymptotes of the given function, if any.

21) $f(x) = \dfrac{36x^4 + x^2 - 6}{x - x^3}$ 21) _____

Find all points where the function is discontinuous.

22) 22) _____



Find the limit, if it exists.

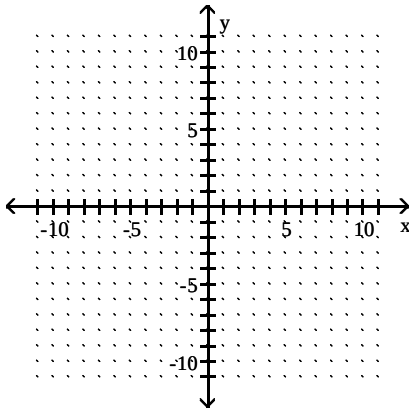
23) $\lim_{t\to 1^+} \dfrac{\sqrt{(t + 16)(t - 1)^2}}{9t - 9}$ 23) _____

Provide an appropriate response.

24) Use the Intermediate Value Theorem to prove that $5 \sin x = x$ has a solution between $\frac{\pi}{2}$ and π. 24) _____

Graph the equation and its tangent.

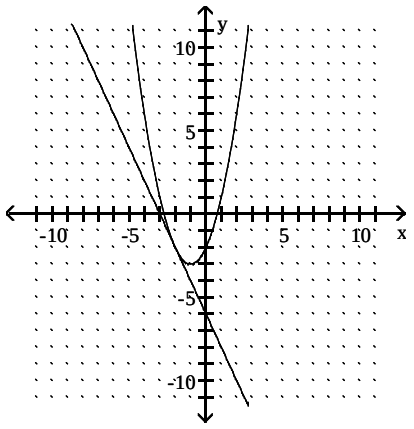
25) Graph $y = x^2 + 2x - 2$ and the tangent to the curve at the point whose x–coordinate is –2. 25) _____



26) Find the slope of a line which is normal to the function of $y = 2x + 1$ at (1, 3) 26) _____

1) x–intercepts: –5, 2, 5; y–intercept: –100
2) {–1, 2}
3) f(3) = –22 and f(4) = 23; yes
4) $\frac{-7 + \sqrt{49 + 4e^2}}{2} \approx 0.932$
5) {ln 8 – 6}
6) 10.1 years
7) $\frac{\pi}{6}$
8) $f^{-1}(x) = \cos^{-1}\left(\frac{x - 6}{7}\right)$
9) $\frac{\pi}{12}, \frac{11\pi}{12}, \frac{13\pi}{12}, \frac{23\pi}{12}$
10) $-2 \cot^2 \theta$
11) $\theta = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6}$
12) $-\frac{27}{8}$
13) 1/2
14) 0
15) ∞
16) x = –12, x = 0, x = 7
17) ∞
18) –2
19) $\frac{4}{7}$
20) 6
21) no horizontal asymptotes
22) x = 3
23) $\frac{\sqrt{17}}{9}$
24) Let $f(x) = \frac{\sin x}{x}$ and let $y_0 = \frac{1}{5}$. $f\left(\frac{\pi}{2}\right) \approx 0.6366$ and $f(\pi) = 0$. Since f is continuous on $\left[\frac{\pi}{2}, \pi\right]$ and since $y_0 = \frac{1}{5}$ is between $f\left(\frac{\pi}{2}\right)$ and $f(\pi)$, by the Intermediate Value Theorem, there exists a c in the interval $\left(\frac{\pi}{2}, \pi\right)$, with the property that $f(c) = \frac{1}{5}$. Such a c is a solution to the equation $5 \sin x = x$.

25)



26) –1/2