Math2_Calculus_Trig.pdf

Page 1 – Calculus (I)

1. Find the integral of $f(x) = 4x^3$
2. Differentiate $y = 2e^x$
3. What is the derivative of $y = \ln(x^2)$?
4. $\lim(x \to \infty)\ (1/x)$
5. Evaluate $\int 5\ dx$ from $x = 1$ to $x = 6$
6. What is the slope of the tangent to $y = x^2$ at $x = 3$?
7. Chain rule: $d/dx\ [\sin(x^2)]$
8. Product rule: Differentiate $y = x \cdot \ln(x)$
9. Quotient rule: Differentiate $y = x/(x+1)$
10. What is the limit as $x \to 0$ of $(1-\cos(x))/x$?

Page 2 – Calculus (II)

1. What is the integral of $1/x\ dx$?
2. Find all critical points of $f(x) = x^3 - 9x$
3. Second derivative of $y = \sin(x)$
4. Area under curve $y = x^3$ from $x = 1$ to $x = 2$
5. Find maximum of $f(x) = -x^2 + 4x + 5$
6. Mean Value Theorem statement
7. $\lim(x \to 1)\ (x^2 - 1)/(x - 1)$

8. Taylor expansion of sin(x) at x = 0
9. Integrate ∫tan(x) dx
10. What is a local minimum?

Page 3 – Calculus (III)

1. Differentiate $f(x) = \ln(x) \cdot e^x$
2. Find dy/dx if $y = x^4 + x^3 + 3x^2 + 1$
3. Integrate $\int(7x^2 - 4x + 3)\, dx$
4. Find inflection points of $f(x) = x^4 - 4x^2$
5. $\lim(x \to \infty)\ (2x^3 - x)/(x^3 + x^2)$
6. Find slope of tangent to $y = x^3 - 2x$ at x = 1
7. Find where $f(x) = x^2 - 4x + 3$ is increasing
8. Integrate $\int \sec^2(x)\, dx$
9. Differentiate $y = \cos(3x)$
10. What is the derivative of a constant?

Page 4 – Trigonometry (I)

1. What is cos(0°)?
2. sin(90°) = ?
3. tan(180°) = ?
4. What is the range of y = sin(x)?
5. Period of y = 2cos(x)?
6. Solve: tan(θ) = 1

7. Find all solutions for $\sin(x) = 0.5$, $0 \leq x \leq 2\pi$
8. Prove $\cos^2(x) - \sin^2(x) = \cos(2x)$
9. Graph $y = 3\cos(x)$
10. Amplitude of $y = 5\sin(x) + 1$

Page 5 – Trigonometry (II)

1. Law of sines: $a/\sin A = b/\sin B$
2. Law of cosines: $c^2 = a^2 + b^2 - 2ab \cdot \cos(C)$
3. Angle sum identity: $\sin(A+B)$
4. Solve for θ: $2\sin(\theta) = 1$
5. What is the radian measure of $60°$?
6. What is an asymptote in $\tan(x)$?
7. Graph $y = \tan(x)$
8. Find exact value: $\sin(\pi/4)$
9. Find all angles where $\cos(\theta) = -1$
10. What is an inverse cosine?

Page 6 – Statistics (I)

1. Define standard deviation
2. Find mean of [3, 6, 9, 12]
3. Median of [4, 5, 8, 11, 15]
4. What is variance?
5. What is a random variable?

6. Probability: roll a die, get 5
7. Normal distribution properties
8. What is a scatter plot?
9. Mode of [2, 2, 5, 7, 9, 9, 9]
10. What is a z-score?

Page 7 – Statistics (II)

1. Define probability
2. Event A: P(A) = 0.3, B: P(B) = 0.2, $P(A \cup B)$ = ? if disjoint
3. Quartile explanation
4. Histogram vs. bar chart
5. Interquartile range of [1,2,3,4,5,6,7,8,9]
6. Outlier definition
7. What is correlation coefficient?
8. Permutations: 5 books on a shelf
9. Combinations: 3 out of 8 people
10. Probability: flip 3 coins, all tails

Page 8 – Linear Algebra (I)

1. Define a 3×3 matrix
2. Multiply: [[2,1,0],[0,1,2],[1,2,3]] × [1,2,3]
3. Find determinant of [[2,1],[1,2]]
4. What is a vector space?

5. What is the zero vector?
6. If A = [[1,2],[3,4]], what is A^T?
7. Eigenvalues of [[4,0],[0,3]]
8. Add matrices: [[1,2],[3,4]] + [[5,6],[7,8]]
9. Scalar multiplication of a matrix
10. What is the identity matrix?

Page 9 – Linear Algebra (II)

1. Find the inverse of [[2,1],[1,1]]
2. Solve Ax = b for x: A = [[1,2],[3,4]], b = [5,11]
3. Rank of a matrix
4. What is a diagonal matrix?
5. Definition of orthogonality
6. Trace of [[1,0,0],[0,2,0],[0,0,3]]
7. Symmetric matrix explanation
8. What is a basis?
9. Null space of a matrix
10. Solve system: x + 2y = 5, 3x - y = 4

Page 10 – Word Problems

1. A car travels 60 miles/hr for 5 hours. Distance?
2. Rectangle has area 56, width 7. Length?
3. 12 pencils cost $4. How much for 21?

4. If $f(x) = x^2 + 1$, what is $f(3)$?
5. Ball thrown upward at 10 m/s, how high after 2s?
6. If two numbers sum to 24, one is 10, what's the other?
7. Tickets are $7 for adults, $5 for kids. Total $44 for 8 tickets. How many adults?
8. Solve: $x + 3y = 13$, $2x - y = 4$
9. A circle has area 78.5. What is the radius? (π=3.14)
10. If $x/2 = 9$, $x = ?$