Some Additional Review Problems from the Textbook

This is not an exhaustive list of all possible type of problems.
Answers and solutions to odd exercises are in the book and Student Solutions Manual, respectively.
(For more problems, see your class notes, examples in the book and homework problems.)

Section	Problems	Section	Problems
1.5	9, 17, 33	1.6	9, 19, 21, 39, 43
		1.8	3, 13, 35, 45, 49(b), 53
Chap 1 Review	Concept Check: 12-19, True-False Quiz: 6-22, 24-27, Exercises 23-40, 45-52.		
2.1	3(a, b), 5, 13, 27, 33	2.2	1, 9, 23, 35, 47
2.3	25, 33, 51, 61, 69, 81	2.4	7, 9, 23, 41, 45
2.5	33, 41, 49, 51, 61	2.6	9, 15, 21, 29, 59
2.7	1(a-f), 9	2.8	9, 13, 15, 17, 25, 29, 45
2.9	3, 11, 17, 23, 27		
Chap 2 Review	All three parts, except Exercises 7-9, 12, 43, 44, 49-52, 73, 75, 76, 82, 83 and 89-92.		
3.1	39, 47, 51, 55	3.2	7, 11, 19
3.3	11, 13, 23, 35, 39, 43	3.4	15, 17, 21, 25, 55
3.5	15, 17, 25, 29, 39, 49	3.7	15, 21, 31, 35, 37
3.8	7, 11, 13, 17	3.9	15, 19, 33, 57
Chap 3 Review	All three parts, except Exercises 29-32, 48 and 61-66.		
4.1	3, 13, 21	4.2	9, 23, 37, 49, 63
4.3	11, 13, 29, 31, 33, 37	4.4	9, 11, 25, 31, 41, 57
4.5	17, 19, 25, 27, 39, 51		
Chap 4 Review	All three parts, except Exercises 31-34 and 52-58.		
5.1	9, 11, 15, 17, 35	5.2	7, 9, 11, 17, 29
5.3	5, 11, 17, 19, 37	5.4	9, 13, 17, 21, 23
5.5	5, 11(a, b), 13		
Chap 5 Review	All three parts, except Exercises 18, 29(b), 33 and 34.		

Calculus I
Math 1210
Sample Final Exam - 6 pages

NAME: _____

Time Limit: 1 hour and 50 minutes Calculator Allowed: Scientific

The point value of each problem is in the left-hand margin. You must show your work to receive full credit for your answers, except on problem 1. Work neatly.

(10) 1. True or False.

( ) (a) The horizontal asymptote of the graph of the function $f(x) = \dfrac{x^2+1}{x+1}$ is $x = -1$.

( ) (b) $\displaystyle\int_1^2 f(x-1)\,dx = \int_0^1 f(u)\,du$.

( ) (c) The differential of $y = x\sin x - 1$ is $dy = x\cos x$.

( ) (d) All polynomials are continuous functions.

( ) (e) The formula of the Newton's algorithm for approximating a solution of the equation $f(x) = 0$ is $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$.

( ) (f) $\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \frac{f'(x)}{g'(x)}$ for all differentiable functions f and g with $g(x) \neq 0$ and $g'(x) \neq 0$.

( ) (g) $\displaystyle\lim_{x\to 0}\frac{1-\cos x}{x} = 1$.

( ) (h) The area of the region between nonnegative function f and the x-axis from $x = a$ to $x = b$ is $\displaystyle\int_a^b f(x)\,dx$.

( ) (i) For the twice differentiable function $f(x)$ if $f''(c) = 0$, then the graph of $y = f(x)$ must have an inflection point at $x = c$.

( ) (j) If function $y = f(x)$ is continuous at $x = x_0$ then f is also differentiable at $x = x_0$.

(15) 2. Find the equation of the line tangent to the graph of $f(x) = x\sin x + 3$ at $x = 0$.

(15) 3. Evaluate the following limits.

(a) $\lim_{x \to -1^-} \dfrac{|x+1|}{x+1}$

(b) $\lim_{x \to 0} \dfrac{\sin(5x)}{\tan x}$

(c) $\lim_{x \to -\infty} \dfrac{-5x^4 - 2x + 100}{2x^4 - 10x^3 - 2015}$

(10) 4. (a) State the Mean Value Theorem.

(b) Find the number(s) c that satisfy the conclusion of the MVT for the function $f(x) = x^3 - x^2 + 1$ and interval [0, 1].

(15) 5. Find the indicated derivative. Do not simplify your answers.

(a) $\dfrac{dy}{dx}$ in terms of x and y, if $\sin(x\,y^2) - x^2 = x + 5$

(b) $f''(\alpha)$, if $f(\alpha) = \alpha\cos\alpha + \tan\alpha$

(c) $\dfrac{dg}{dx}$, in terms of x only, if $g(u) = \dfrac{1-u^4}{\tan u + 1}$ and $u(x) = 3x - 2$

(10) 6. Use the limit definition of derivative to prove that $\dfrac{d}{dx}\left(\dfrac{1}{x}\right) = -\dfrac{1}{x^2}$.

(15) 7. Consider the function $f(x) = \frac{1}{16}\,x^4 - 2x^2$. Find its critical points and determine the intervals in which it is increasing and decreasing. Find the inflection points of its graph and intervals in which it is concave up and concave down. Find x- and y-intercepts of its graph. Graph $y = f(x)$ by using these information and plotting at least nine points.

(10) 8. Find the volume of the solid of revolution generated by revolving the region in the 2nd quadrant bounded by the curve $y = 4 - x^2$ and the coordinate axes about the vertical line $x = 1$.

(15) 9. A 10-meter length of wire is available for making a circle and a square. How should the wire be distributed between the two shapes to maximize the sum of the enclosed areas?

(10) 10. A water cup is in the shape of a right circular cone with its tip down. The height of this cup is $10\,cm$ and its radius at the widest point is $5\,cm$. Suppose water is poured in so that the water height in the cup increases at the constant rate of $1\,cm/min$. Determine the rate (cm^3/min) water is poured in when the water height is $5\,cm$.

(15) 11. Evaluate the following integrals.

(a) $\int \tan^2 x \sec^2 x \, dx$

(b) $\int_0^{\sqrt{5}} \frac{x}{(x^2+1)^3} \, dx$

(c) $\int_{-1}^{2} x\sqrt{2-x} \, dx$

(10) 12. A right circular cylinder of radius 2 feet and height 15 feet is full of water. How much work does it take to pump the water to a level 6 feet above the top of the tank? Assume the water weighs $62.5 \, \frac{lb}{ft^3}$.