Name: ______________________________ **Section:** __________

Names of collaborators: ______________________________

Main Points:

1. Basic Trig Facts
2. Differentiation
3. Antiderivatives and indefinite integrals
4. Substitution
5. Areas and definite integrals

1. Basic Trig Facts

See Appendix D in the textbook for a review of trigonometry. You are expected to know basic facts about the six trigonometric functions, including their values at standard angles, the shapes of their graphs, and the Pythagorean identities.

Exercises

1. Fill in the following table, using the five standard angles in the first quadrant.

Angle, θ		$\sin\theta$	$\cos\theta$	$\tan\theta$
deg	rad			

2. State the three Pythagorean Trig Identities:

   (a)

   (b)

   (c)

3. $\sin(-150°) =$ ____________________

4. $\cos\left(\dfrac{3\pi}{2}\right) =$ ____________________

5. $\csc(120°) =$ ____________________

6. $\tan\left(\dfrac{-5\pi}{4}\right) =$ ____________________

2. Differentiation

Make sure you know the derivatives of the following "standard" functions: power functions, exponential functions, log functions, trig functions, inverse trig functions, as well as rules for differentiating combinations (sums, differences, products, quotients, compositions) of functions.

Exercises

7. For each function below, state what kind of function it is (power, exponential, log, trig, inverse trig) and differentiate.

   (a) $f(x) = x^5$

   (b) $g(x) = 5^x$

   (c) $h(x) = \cos x$

   (d) $Q(t) = t^{4/3}$

(e) $P(t) = \ln t$

(f) $\theta(t) = \sec^{-1}(t)$

(g) $J(s) = \cot(s)$

(h) $I(s) = e^s$

8. Differentiate.

(a) $y = \sqrt{x} + \sqrt{\pi}$

(b) $y = x^4 \sin(3x)$

(c) $y = \sin x \cos x$

(d) $y = \dfrac{3t+1}{2t-1}$

(e) $y = \arcsin(x^2)$

3. Antiderivatives and indefinite integrals

Make sure you can find antiderivatives by recognizing a function as the derivative of a "standard" function, using algebra to rewrite if necessary first. Remember that an indefinite integral is a family of antiderivatives, which are related by vertical shifts ($+C$.)

Exercises

9. State an antiderivative for the following functions:

   (a) $f(x) = 3\cos x + 1$

   (b) $p(s) = s^2 + s^{-2}$

   (c) $g(x) = \csc x \cot x$

   (d) $R(z) = z^{-1}(z + 1)$

10. Evaluate the indefinite integrals

    (a) $\int e^x + e^2 \, dx$

    (b) $\displaystyle\int \frac{1}{1 + w^2} \, dw$

(c) $\displaystyle\int \frac{5+s}{\sqrt{s}}\, ds$

4. Substitution

The technique of substitution is used to "undo the chain rule." See Section 5.5 if you need a refresher.

Exercises

11. Evaluate the indefinite integrals, using substitution.

(a) $\int 2x\, e^{x^2}\, dx$

(b) $\int t^2\,(t^3+3)^9\, dt$

(c) $\int \sin^5\theta\, \cos\theta\, d\theta$

(d) $\int s^3\sqrt{s^2+1}\, ds$

5. Areas and definite integrals

The definite integral is used to find areas. We usually use the antiderivatives to evaluate definite integrals (FTC.)

Exercises

12. Evaluate the definite integrals.
    (a) $\int_0^9 w^{-1/2}\, dw$
    (b) $\int_1^{e^2} t^{-1}\, dt$
13. Find the (signed) area between the given curve and the x-axis, from $x = a$ to $x = b$.
    (a) $y = x^4$, $a = 0$, $b = 1$
    (b) $y = \sin x$, $a = -\pi/4$, $b = \pi/4$
    (c) $y = 2x\, \cos(x^2)$, $a = 0$, $b = \sqrt{\pi}$