

Worksheet 1: Calculus Review

On a separate sheet of paper, attempt the following problems. At the end of class turn this in with your name on top and you will get participation points (as long as you attempted at least half the problems). There is no pressure here, just a chance to practice your calculus skills. In weeks 3-5 and 8-9 of this course you will need to remember your derivative skills. In weeks 6-7 and 9 of this class you will need to remember your integration skills. If you are worried about that, then plan to work ahead on those assignments so you can anticipate your difficulties and talk to a tutor.

1. Derivatives

- (a) Do you know your basic rules? Try these quick derivatives (for each one find $\frac{dy}{dx}$):
- a) $y = 5x^{10}$ b) $y = \frac{5\sqrt{x^3}}{2}$ c) $y = \cos(3x^2)$ d) $y = 7\ln(x) - \frac{6}{x}$
e) $y = \tan^{-1}(5x)$ f) $y = 3\sec(2x + 1)$ g) $y = \sqrt{x^2 + \sin(4x)}$ h) $y = x^2e^x$
- (b) Later in the term, we will do derivatives with some variables treated as constants. Here's a preview
- i. Find $\frac{dy}{dx}$ for $y = (2x^2 + 4)^3$.
ii. Find $\frac{dy}{dx}$ for $y = (5x^2 + 3)^3$.
iii. Find $\frac{dy}{dx}$ for $y = (tx^2 + z)^3$ where t and z are constants.

2. Integrals

- (a) Can you do "one-step" integrals? Try these:
- a) $\int 5x^3 + 1 \, dx$ b) $\int 4\sin(x) \, dx$ c) $\int e^{3x} \, dx$
d) $\int \frac{4}{x^2 + 1} \, dx$ e) $\int \csc^2 x \, dx$ f) $\int \frac{1}{x} - \frac{4}{\sqrt[3]{x^2}} \, dx$
- (b) Can you do substitution? Try these:
- a) $\int xe^{x^2} \, dx$ b) $\int x^3 \cos(x^4) \, dx$
c) $\int \frac{\ln(x)}{x} \, dx$ d) $\int \tan(x) \sec^2(x) \, dx$
- (c) Can you do by parts? Try these:
- a) $\int xe^x \, dx$ b) $\int x \sin(x) \, dx$ c) $\int x^2 \ln(x) \, dx$
- (d) Can you do half angle? Try these:
- a) $\int \sin^2(x) \, dx$ b) $\int \cos^4(x) \, dx$
- (e) Can you do partial fractions? Try this one: $\int \frac{1}{(x+1)(x+2)} \, dx$
- (f) Can you do trig substitution? Try this one: $\int \frac{1}{x^2\sqrt{x^2-1}} \, dx$